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HERNIATION OR RUPTURE OF THE INTERVERTEBRAL DISC INTO THE SPINAL CANAL*

Report of Thirty-Four Cases

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IN the course of a good many years' experience with tumors of the spinal cord we had become familiar with the so-called enchondroma of the intervertebral disc. We had also become accustomed to the statement of the pathologist that he supposed the tumor must be an enchondroma, but that on section it looked like normal intervertebral disc. About three years ago Dr. Joseph Barr of the Orthopedic Department of the Massachusetts General Hospital impressed upon us the idea that these masses were identical with the nodules described by Schmorl[17]. It is interesting to note that Schmorl states quite positively that these nodules seldom if ever cause neurological symptoms. Investigation of the literature and our own cases resulted in a preliminary report by Mixter and Barr[14] of nineteen cases largely from the records of the Massachusetts General Hospital.

As far as we can determine rupture and extrusion of the intervertebral disc into the spinal canal was first described in 1911 independently by Goldthwait[10] in this country and by Middleton and Teacher[13] in England, but these contributions seem to have been forgotten. At any rate, the subject received scant attention for a good many years. In the meantime reports of enchondroma or ecchondroma of the intervertebral disc began to appear. Elsberg[7] in 1916 mentions the subject and states that Oppenheim had observed such a case. Clymer, Mixter and Mella[5] in 1921 note a similar case. Numerous other reports by Elsberg[8], Stookey[19], Bucy[3], Petit-Dutaillis and Alajouanine[16], Adson[1] and others came into the literature. Dandy[6] in 1929 reported two cases from which he had removed loose cartilaginous fragments protruding into the spinal canal. He considered them undoubtedly traumatic in origin. Elsberg[9] in 1931 again described these growths. The subject has been discussed more recently by Alpers, Grant and Yaskin[2], who collected a large group of cases of chondroma from the literature up to 1933. Peet and Echols[15] report two cases of herniation of the nucleus pulposus observed at operation. Mauric[12] in 1933, from a study of the literature, came to the conclusion, although he had observed no cases himself, that many of the so-called enchondromata and Schmorl's nodules were identical. We had come to the same conclusion about the same time from clinical observations.

In our earlier cases, as in the references quoted above, the differential diagnosis lay between tumor and ruptured disc. We have been unable to find in the literature any group of cases in which the diagnosis was made in the absence of pronounced neurological signs and in which the differential diagnosis lay between low back strain of one sort or another and rupture of the intervertebral disc. The considerable number of such cases of this type which we are now able to report is the main reason for this communication.

In the eighteen months since the report of Mixter and Barr[14] we have observed fifteen additional cases. Our present paper is based on a study of the whole series of thirty-four cases, proved at operation, twenty-three of which were into the lumbosacral canal. Since 1912, in addition, there have been observed at the Massachusetts General Hospital six cases of true cartilaginous neoplasm of the spine. As these present an entirely different picture both clinically and pathologically from rupture of the intervertebral disc, they are omitted from this paper.

The disc specimens obtained at operation vary considerably as to the amount of annulus and nucleus present*. Dr. Charles Kubik, neuropathologist at the Massachusetts General Hospital, has reviewed many of these specimens and feels that both nucleus and annulus are represented in most. At operation one is impressed with the fibrous character of the extruded fragment. We believe, therefore, that the term

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*The normal intervertebral disc is composed of two quite different cartilaginous structures. The annulus fibrosus is as its name implies a ring-like structure of fibro-cartilage. Within this ring is a soft lenticular body, the nucleus pulposus. This structure is 75 per cent water and contains cellular elements from the notochord in a rather gelatinous matrix in which elastic fibrils are found.

herniation or rupture of the intervertebral disc is more descriptive than "prolapse of the nucleus pulposus" as coined by Schmorl. (Fig. 1.)

HERNIATION OF DISC INTO LUMBOSACRAL CANAL

Incidence: Of the twenty-three patients with this type of lesion, only four were women. At the time of operation the youngest was twenty years, the oldest sixty-four. The ages thirty to

FIG. 1. Microphotograph from specimen obtained at operation. L. C., M G. H. No. 325587. Material from annulus on the left, and from nucleus on the right.

fifty furnished two-thirds of all the cases. No racial disposition was indicated.

Etiology: A satisfactory history of antecedent trauma was obtained from fourteen patients and specifically denied by five. In only seven (one-third of all the cases) did it seem certain that an accident was followed *immediately* by the symptoms for which later the operation was performed.

It would be of interest to correlate as factors in causing rupture of a disc the physical development, body mechanics and nutritional state of the patients. This study, however, was not made. All we can say is that the work engaged in at the time of the rupture represented a wide variety of indoor and outdoor activity and that the individuals afflicted were not conspicuous for under- or over-development, nor were they otherwise, with one exception, chronic invalids.

As a typical example of the group under discussion the following case history is given:

CASE 1: D. S., No. 342673 M. G. H., a man of slight build, forty-four years old, machinist in a cotton mill, complains of low back pain of two years' duration, radiating to the right buttock and down the posterior aspect of the right thigh and leg. There is no pain elsewhere and no difficulty with sphincters. The present symptoms are similar to pain experienced six years ago which came on suddenly when lifting a heavy bale of cloth, necessitating bed rest for five weeks. In the intervening four years he has been well and active.

He stands and walks with a list forward and to the right, bends body forward with caution and associated flexion of the right knee. There is tenderness on pressure over the right sacro-iliac joint and increased pain in this region on straight leg raising which is greatly limited on this side. Although gluteus, hamstrings and calf appear a little softer and smaller on the right than on the left side, no appreciable weakness is observed, and sensory loss is limited to hypesthesia of skin over the external aspect of the lower right leg. The sole reflex abnormality is absence of the right Achilles jerk.

Combined lumbar puncture with needles at L1-2 and L5-S1 spaces shows no block, both fluids clear, colorless and in every respect normal except for elevation of protein, 59 mg. and 67 mg. respectively. (It is almost certain that both needles were above the tumor.)

X-ray after lipiodol injection into L1-2 space shows a concave defect in the lipiodol column outlining a rounded mass in the canal on the right side between the fifth lumbar vertebra and the sacrum.

At operation a piece of ruptured disc was found at the place indicated by lipiodol, and observed to press directly on the fifth lumbar root.

Symptoms and Signs: As the site of the lesion in our cases varied so little, and the size of the herniated portion of the disc was found to be so uniform, it is not surprising that symptoms and signs should be similar. It is more in the course of the disease than in the nature of symptoms that we find individual differences.

Sensory Symptoms and Signs: Pain was the first symptom in every case, and it was for relief of pain that all except two sought relief; in two only, disability was of prime importance. The pain was usually described as an ache in the low back, usually just to one side or the other, becoming paroxysmal on turning, stooping, coughing and sneezing, whereupon it would radiate outward over the buttock and down the back of the thigh, and at times the back of the leg also. Not infrequently the pain commenced in the mid-line and radiated down the back of both thighs, but unilateral distribution was the rule, even though symptoms had lasted many months. Pain in the perineum also was present in three patients. In only one was the pain referred to the anterior aspect of the thigh.

To minimize the pain, many patients assumed a slight stoop in walking and standing, and on examination the lumbar muscles were found in protective spasm. Tenderness even on gentle percussion over the low spine, lumbosacral ligaments and sacro-iliac joint was commonly present, and yet rarely was the sciatic nerve tender on deep palpation. Notwithstanding, straight

leg raising in the supine position was greatly restricted on the affected side (and also to a less extent on the unaffected side).

In spite of very great pain, little objectively determined sensory loss was the rule, and only rarely was bilateral saddle anesthesia obtained.

Numbness and paresthesiae frequently alternated with pain or were substituted for it.

Motor Symptoms and Signs: While the patients usually complained of weakness of one leg, it often seemed to the examiner that the weakness was more seeming than real, due to protective spasm. Yet flaccid weakness and rarely paralysis were definitely observed in six patients, a unilateral foot-drop being a rare but striking finding. In the histories it is frequently noted that on some movement a stabbing pain in the back, perhaps radiating down one leg, would be accompanied by an equally sudden transitory loss of power in that limb. *Atrophy,* always of slight degree, was associated with the weakness, and as expected was most conspicuous in gluteal, hamstring and calf muscles. As evidence of the slow progress of the disease, in one patient it took seven years for the thigh and calf muscles to lose each four cm. in circumference.

Tremors, gross or fibrillary, were not observed.

Reflexes: The sole reflex abnormality noted in most cases was a loss of the Achilles jerk on the affected side, or of both in case of bilateral involvement. The associated plantar reflex was often not obtained, but was never extensor in type. Occasionally the knee jerk on the affected side was sluggish. The gluteal reflex was found diminished when this muscle was atrophied.

Of greatest significance is the fact that in eight patients *no abnormality of the reflexes whatsoever could be demonstrated.*

Sphincters: Urinary and rectal incontinence were late manifestations in four cases, always associated with bilateral involvement of the extremities.

In summarizing the clinical aspects of these twenty-three cases, several points stand out and should be stressed:

1. Pain is the first and, with a few exceptions, remains the most important symptom throughout the course of illness. The pain is primarily in the low back with sciatic radiation mainly, and is increased by coughing, sneezing and bending.

2. The symptoms and signs remain unilateral in more than half of the cases; eight were on the left, and seven on the right side at the time of operation. Less frequently symptoms are bilateral from the onset, or become bilateral during the course of the illness.

3. No regular course of illness is indicated. In some cases the symptoms have progressed during two or three months with almost no interruption, with involvement of one lower extremity, then the other, and finally sphincter loss. More frequently, however, symptoms have remained unilateral and have been intermittent over a period of many months or years, the patient enjoying relatively good health between attacks.

Spinal Fluid: Fluids were studied in twenty-two of the twenty-three cases. The significant fluid examinations in these cases have proved to be two only; an estimation of the protein content and the determination by manometry of subarachnoid block. The remainder of the examinations, cell count, colloidal gold and Wassermann tests, have been routinely performed and found negative and of no diagnostic significance, except to exclude syphilis and inflammatory disease.

The technique of puncture has varied; at times a single needle below the lesion, on several occasions one needle above and one below, but all too frequently because of the low site of the lesion we had to be satisfied with fluid obtained solely from above the site of the ruptured disc. Subarachnoid block, nevertheless, was determined by single or multiple puncture in eight cases. In no case was the block complete and often the latent period accompanying rise and fall in pressure in the manometer was indeed slight. In only three cases was the fluid from below the lesion xanthochromic.

Whether obtained from above or below the lesion, *every fluid showed an elevation of its protein contents.* For the most part the protein of the fluid was not excessive, even when from below the lesion; although 1800 mg. and 798 mg. per 100 cc. were obtained in two cases, the figures were usually less than 200 mg. From above the lesion the amounts were between 56 mg. and 91 mg. per 100 cc. (40 mg. high normal by the technique used).

X-Ray Examination: Films, even stereoscopic, failed to show direct evidence of a ruptured disc. Rarely was a lesion hinted at by a slight narrowing of the disc (five cases), or by localized spur formation or arthritis. In one case only was arthritis marked, and it was partly on the supposition that arthritis might explain the symptoms that operation was withheld for seven years.

Our experience with x-ray examination *following injection of lipiodol* places this procedure as of prime importance in diagnosis and localization of disc rupture. In our earlier use of lipiodol, the lesion was not clearly disclosed; with our present technique, elaborated particularly by Dr. A. O. Hampton of the x-ray department, we were frequently able to obtain results which were almost pathognomonic for herniation of the disc.

The technique is simple enough if two things are constantly kept in mind, i.e., that we are

trying to show a small mass which seldom causes compression of the whole cauda equina, and that the lesion always lies anterior to the dura. It is not our aim to show subarachnoid block, but to show a defect in the lipiodol shadow at the site of a protruded intervertebral disc. For this purpose the usual 1.5 cc. or 2 cc. of lipiodol, sufficient to demonstrate block, is not enough, and we now use 5 cc. in order nearly to fill the lumbosacral canal. The injection is best made by puncture a little above the suspected lesion to prevent a breaking up of the oil into globules.

The patient in the *prone* position is then examined fluoroscopically on the tip table, films being taken when an excavation in the lipiodol shadow at the level of a disc becomes apparent. If the hernia is of the L 4—5 disc (as usual in this series), 5 cc. of oil fills the canal above this point. Films taken with the patient sitting or standing and from various angles with the axis of the spine, usually localize the lesion. (Figs. 2, 3, 4 and 5.)

Of the twenty-one patients of this group in whom lipiodol was employed, visualization of the hernia was satisfactory in sixteen. In the last ten cases of the series the demonstration has been so certain that a preoperative diagnosis of hernia of the disc has been made. In five patients who complained solely of unilateral pain and who showed no objective sensory, motor or reflex abnormality, an increased protein was found in the spinal fluid, and a characteristic notching of the lipiodol shadow correctly indicated a disc hernia.

Differential Diagnosis: The majority of the cases of this series so closely resembled back strain, lumbosacral or sacro-iliac strain as to be indistinguishable from these conditions. When the symptoms were strictly unilateral, as they were in fifteen of the twenty-three cases, this diagnosis appeared quite satisfactory; indeed a very considerable number had been carried on as "sacro-iliac strain" for some time and would have been continued under this label if it had not been for the spinal fluid and lipiodol findings. Even the loss of an Achilles jerk, by far the commonest sign of nerve root involvement, was not considered conclusive, as it is maintained by some that this reflex may be lost in sacro-iliac affections.

It is unnecessary to recount numerous friendly discussions with our orthopedic confreres over these debatable cases, but the essence of the consultations briefly would come to this, that all would agree that the clinical picture presented was characteristic of sacro-iliac strain, or other orthopedic condition, and that we should operate for a herniated disc only if shown by lipiodol.

In the differential diagnosis, tumor also was considered. In no case did the clinical picture or x-ray findings suggest malignant disease of the spine, and in no case was this diagnosis thought likely; yet benign neurofibroma or other intradural tumor would not have been a surprising finding in our earlier cases. We now feel that x-ray technique with lipiodol should usually differentiate these tumors from disc hernias; and in the last ten cases a preoperative diagnosis of ruptured disc has been found correct.

In two cases localized proliferation suggested old trauma and the intermittency of symptoms over a long period (in one case seven years) seemed consistent with root pressure of spinal origin, perhaps associated with intraspinal adhesions. In fact, the operation in one of these cases disclosed not only the disc hernia but a matting together of the cauda equina justifying our suspicions; in this case alone was evidence found suggestive of intraspinal trauma.

While a symptomatic diagnosis of sciatica was frequently made, in no case was the condition considered as sciatic neuritis.

RUPTURE OF DISC INTO CERVICAL CANAL

Age and sex incidence are similar to the previous group, the youngest being twenty-eight years, the eldest fifty-four years; all the patients except one were men. In one case only was there a causal history of trauma.

With one exception all the cases involved discs between the third and sixth cervical vertebrae, and with one exception the rupture was found primarily in the mid-line. As characteristic of this group Case 2 is presented in some detail:

> CASE 2: M. A. P., No. 327775 M. G. H., an unemployed mill worker of forty-four years, a native of Madeira, entered the hospital March 10, 1933 because of increasing difficulty in walking of two and one-half months, which had progressed so that at the time of admission he was unable to walk alone. For two weeks prior to this complaint he had noticed a numb sensation in both feet which had spread upward to his shoulders, associated with paroxysmal pain between the shoulder blades, increased by coughing. With the onset of the difficulty in walking the pain subsided, but the numbness persisted, mostly on the right side. He had noticed a transitory difficulty in starting the urine.
>
> He presented a spastic quadriplegia especially marked on the right with lively reflexes throughout, bilateral ankle clonus and Babinski signs. While there was coarse tremor of the right arm, no atrophy was apparent. There appeared to be general hypalgesia on both sides of the body, but only on the left side was temperature sense disturbed. No sensory level or zone of hyperesthesia was made out.
>
> Combined cisternal-lumbar puncture showed a definite but not complete subarachnoid block, with cistern protein 20 mg. and lumbar protein 138 mg. per 100 cc.
>
> X-rays disclosed proliferative changes about the margins of the bodies of the lower cervical vertebrae consistent with hypertrophic arthritis. No other variations from the normal were noted. Lipiodol injected into the cisterna magna (ex-

FIG. 2. Spot plates taken during fluoroscopy. Antero-posterior and lateral. C. S., M. G. H. No. 345380. Arrow points to defect.

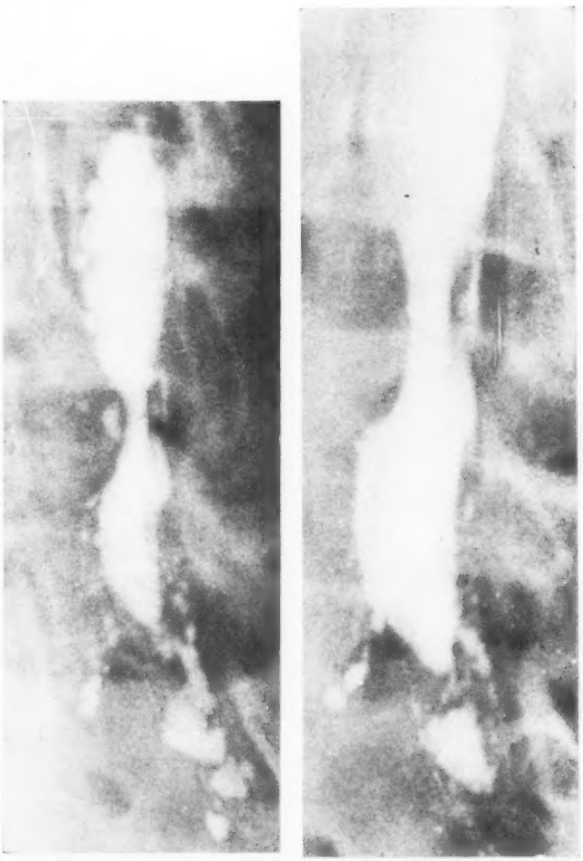

FIG. 3. Spot plates during fluoroscopy showing a good-sized defect as seen at different angles. R. N., M. G. H. No. 343636.

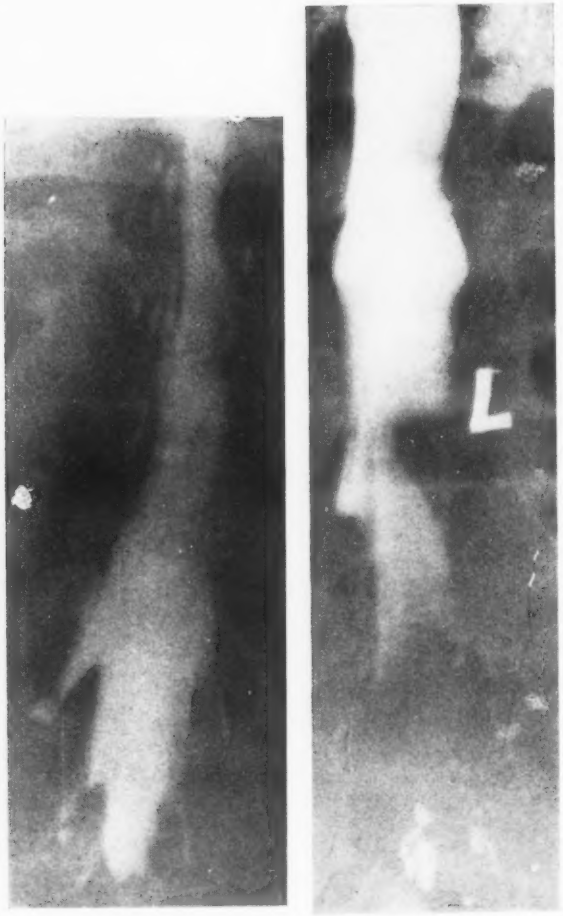

FIG. 4. Spot plates during fluoroscopy. That on the right, with patient in prone position, shows defect. That on the left, supine, does not. P. B., M. G. H. No. 343154.

FIG. 5. Anteroposterior view showing large filling defect. A. K., M. G. H. No. 315898.

FIG. 6. Postoperative x-ray. J. C., M. G. H. BM No. 14393. Note silver clip lying in nucleus pulposus.

amination on the tip table) was temporarily arrested opposite the lower margin of the fifth cervical vertebra. The point of obstruction corresponded to the intervertebral disc.

At operation a disc tumor was in large part removed, by means of an incision in the dura anteriorly. It was found by Dr. C. S. Kubik to be very firm tissue measuring 1.5 x 0.5 x 0.5 cm., having the appearance of cartilage. The surface on all sides had a torn, ragged appearance. Microscopically it consisted of fibrocartilage with a rather loose structure. There were only a few cartilage cells; these were evenly distributed through the fibrous matrix. The histological appearance corresponded very closely to that of nucleus pulposus.

Symptoms and Signs: As would be expected, the clinical picture presented by the seven cases with mid-line hernias was similar in many respects. Sometimes the earliest, and always the most important symptom to the patient, was motor disability of the lower extremities; bilateral stiffness, often with twitching of the legs and a sense of weakness, were the usual presenting symptoms. So insidious at times was the onset that in one man walking was noticed by his friends to be "peculiar" before he himself had observed anything wrong. At about the same time, or shortly before the appearance of stiffness of the legs, most patients experienced pain in the neck, frequently radiating to one or both shoulders, rarely down the spine, and made worse by coughing and sudden movements of the head. Numbness along the inner aspect of the arms and fingers was also commonly observed.

Increase in symptoms and signs usually is gradual, but there are seldom the long remissions noted in the lumbosacral group. Difficulty in walking generally demands attention in from two to four months, but in one case the progress of the disease was so slow that four years had elapsed before the gait was noticeably abnormal. A sense of numbness of the body, and occasionally difficulty in starting the urinary stream added to the discomfort of the patients.

For the most part these symptoms were bilaterally symmetrical from their onset, but in at least two cases a distinct inequality on the two sides was present.

The motor examination as expected showed typically spastic paraplegia without ataxia, with bilateral Babinski signs and ankle clonus; the upper extremities were normal or with alteration of reflexes only, sometimes increased, sometimes decreased, but never with gross disability or atrophy. The sensory findings were as a rule minimal and uncertain, although a zone of hyperalgesia could usually be found at the level of the second ribs, even when no certain anesthesia was indicated below. In one case only was there a Brown-Séquard syndrome.

We have grouped the above seven cases together because of similar symptomatology and signs produced by disc hernias primary in the mid-line. The eighth case of this cervical spine series, in whom the hernia protruded from C 4—5 disc well to the left side, produced such a different clinical picture that it will be considered separately.

CASE 3: A. J. S., No. 334269, M. G. H., a weaver forty-four years old, was admitted to the hospital December 29, 1933 because of pain, weakness and wasting of the left arm. Eighteen months before while cranking up the body of a dumptruck, he slipped and the crank hit his left arm just below the insertion of the deltoid muscle. Work was possible after a few days of pain at the site of the injury. A year after the accident he noticed numbness in the left arm and back, and his arm from then on showed progressive weakness and wasting. Examination showed weakness and atrophy of the left deltoid in particular, but a little weakness and atrophy of the biceps and triceps also, although triceps and biceps reflexes were retained. There was an ill-defined hypesthesia to touch, pain and temperature sense in the upper arm. There was slight inequality of the pupils, the right being greater than the left.

No abnormalities of the lower extremities could be made out. The spinal fluid showed no block, protein in the lumbar sac being 31 mg. X-rays of the spine and left shoulder were negative. The condition was thought to be a traumatic brachial plexus injury.

The patient was readmitted to the hospital three months later because of increasing pain and weakness of the left arm. He now showed an increase since the previous examination in atrophy, twitching of the deltoid muscle, hyperesthesia, and tendon reflexes in this arm, with a Hoffmann sign. The left knee-jerk was now livelier than the right, but without accompanying spasticity, and with normal plantar response. Combined cistern-lumbar puncture gave a questionable block, with cistern protein 24 mg. and lumbar protein 43 mg.

An intraspinal lesion seemed indicated and an exploratory laminectomy was done by Dr. T. J. Putnam, who found a mass, evidently arising from C 4—5 disc well out to the left side, which compressed the spinal cord and over which the fifth cervical root passed. Unfortunately removal was found impossible without sacrificing the fifth root, so decompression alone was done.

Spinal Fluid: Spinal fluid examinations of significance concern solely the dynamic tests for subarachnoid block and the protein content of the fluid. *Block* was demonstrated in seven of the eight cases, but was always partial, and sometimes very slight indeed, even as judged by combined cisternal-lumbar puncture, which was used in five cases. In one case only block was not demonstrated. The protein content of the fluid below the block was slightly elevated as a rule, but in one case was actually below high normal. The protein figures varied from 32 mg. to 186 mg. per 100 cc. Xanthochromia was not observed.

X-Ray: In no case did x-ray examination show direct evidence of disc herniation. In one case a slight narrowing of the appropriate disc,

in two cases local spur formation and in two others scoliosis, suggested a lesion of some kind, but in none was the correct diagnosis possible from x-ray of the spine alone.

Lipiodol injected into the cisterna magna was employed in six of the seven cases. There was definite lipiodol cap in four, and in one case in which no block had been demonstrated by fluid examination and no clinical level could be made out, it was the one dependable sign which led to operation. In one case, in which subarachnoid block was demonstrated by fluid examination, lipiodol passed down the canal without arrest, and in another case lipiodol seemed to be blocked at C 1, although the hernia was found at C 3—4.

In these cases the flow of lipiodol was followed fluoroscopically by examination of the patient on the tip table. The results are not uniformly satisfactory, yet in one case the evidence obtained was of paramount importance, and in three cases confirmatory evidence of block and localization was of such value as fully to justify the use of the oil.

DISCUSSION

Emphasis should be laid on the very considerable spasticity exhibited by these patients with little or no ataxia. This point has been stressed both by Elsberg[9] and by Stookey[19], and is amply corroborated by a study of our cases. Their explanation seems reasonable, namely, that the posterior columns are at too great a distance from the compressing hernia to be affected; certainly they are not so readily exposed as are the pyramidal tracts. We have sought for evidence of early loss of pain sense as found by Stookey[19], but fail to show that there is regularly such dissociation.

We believe that the diagnosis of hernia of the intervertebral disc in the cervical region can be only tentative and that true neoplasm is always a possibility in these cases.

In several cases a diagnosis of multiple sclerosis was considered until the demonstration of block made that diagnosis untenable.

In the single case in which root pain and atrophy were present, a disc lesion was not seriously considered until early signs of compression became manifest, which justified an "exploratory" laminectomy. A herniated disc was unexpectedly found.

Three patients had herniations of the disc at the thoracic level. We shall not at this time discuss them except to say that a diagnosis of ruptured disc was not made before operation. The symptomatology differed from cervical spine hernia mainly in one respect; in all three cases ataxia was prominent.

OPERATIVE TREATMENT

The technique of operation on patients with unilateral symptoms indicating a disc lesion at the lumbar level, differs considerably from the method usually employed in exploration of the cauda equina for tumor. The reason for this is that the position of the lesion makes its demonstration difficult in some instances. If the preoperative signs and symptoms are clear-cut, we have fairly exact knowledge of the level and of the side involved. In such a case the laminectomy may be limited to two or three vertebrae, but it should extend well out on the side of the lesion. It is our practice to preserve the spinous processes, undercutting them and leaving them attached to the muscles of one side. Two laminae on the side involved are removed, carrying the exposure well out and removing the articular facets to give wider exposure. It is sometimes necessary to remove part of one pedicle. The lesion can usually be felt before the dura is opened, but it is frequently small and may be hidden far out in the intervertebral foramen.

Sometimes the nodule can be exposed by retracting the dura and reaching it from the side. At other times it is easier to open the dura and then incise it again over the lesion. The extruded portion of the disc may be opposite the disc from which it has been torn or may be just above or below it. The lesion feels smooth and hard, and is frequently hemispherical in shape. If lateral, it usually presses against the nerve roots lying in their sheath. The mass lies in front of a dense fibrous membrane, the posterior spinal ligament. When this is incised the disc fragment usually, lying free, can be picked up with forceps. Occasionally the fragment is firmly attached to the edge of the disc. Search will almost always reveal an opening running down into the nucleus pulposus. (Fig. 6.)

Elsberg[8] has described the technique of removal of these masses in the cervical and dorsal regions. We have followed his method closely. The dentate ligament is cut and the cord rotated, thus exposing the mass bulging through the anterior dura. Incision is made in the dura as he has described, and the fragment removed. It is our impression that the extruded fragment is more frequently connected with the disc than is the case in the lumbar region.

RESULTS

The first and perhaps the most striking result of operation in the lumbar cases is the immediate relief of pain in the leg. This relief has been complete and permanent in all but one of our cases. Some patients complain subsequently of lame back, but on the whole the operation has been most satisfactory. All of the patients have shown marked improvement in straight leg raising, many of them reaching eighty-five or ninety degrees of flexion. Tenderness of the lumbar spine is much less marked than before operation. Neurological signs, if present before operation, may or may not change.

Results in the patients with cervical lesions

have not been so satisfactory. Many continue to complain of the symptoms which they had before operation and remain spastic. On the whole, however, they too are improved.

In the whole series there has been one death attributable to the operation. In this case the wound was soiled with feces soon after operation, sepsis developed and the patient died of meningitis. Three others of the earlier group have since died, two probably as the result of urinary sepsis, while the cause of death in the third is unknown.

SUMMARY AND DISCUSSION

We realize that this subject opens up an interesting problem in industrial medicine. Injuries to the spine have long been a fruitful source of industrial accident compensation. It is unfortunate that we must further complicate this subject by adding another to the long list of possible injuries of the spine. We believe that this condition is rare as compared with back strain, fracture, sacro-iliac strain and the like, and that the diagnosis should not be made, even provisionally, without the proper evidence. We have stated that the examination of the spinal fluid and x-ray examination with lipiodol are of the greatest importance. We can say with equal emphasis that without increase of protein in the spinal fluid and without positive roentgenological evidence, even a tentative diagnosis of rupture of the intervertebral disc in the lumbar region should not be made. In the cervical region the differentiation of new growth and ruptured disc must at present remain obscure until proved at operation. This should go far toward preventing the loose application of this diagnosis to ill-defined injuries of the spinal column.

1. *The Hernia*

We believe that herniation of the intervertebral disc into the spinal canal is a definite pathological entity. The herniated mass producing symptoms and leading to operation has varied from ½ to 2 cm. in size. Irrespective of the size, we wish to emphasize that neither from gross nor microscopic appearance do they resemble true cartilaginous or other tumors. It follows that increase in symptoms must be due in large part to progressive protrusion of the disc and modification of tissues adjacent rather than to added growth as in neoplasm.

The physiological mechanism causing the disc rupture is still undetermined and we do not wish to commit ourselves on this point. We have purposely avoided a title to the paper which stresses the nucleus pulposus as the cause of the rupture or which indicates that the mass found at operation is a chondroma. It may in time develop that the weak point allowing such a rupture will be found to be the result of disease of the annulus fibrosus. The occurrence of these hernias chiefly in persons advanced in years perhaps favors a preëxisting degenerative process.

FIG. 7. Sketch from operation notes, showing position of the lesion. C. S., M. G. H. No. 343380.

Trauma, as an immediate cause of rupture, appears to be quite certain in over one-half of our lumbosacral group, and in this we are in agreement with Dandy, Alpers and others. In the cervicodorsal group, however, like Elsberg and Stookey, we failed to obtain a definite history of injury.

We are unable to establish any type of individual patient or any occupation in which disc hernias predominate, but the excess of males over females so afflicted is worthy of comment, and in this respect we are in general agreement with other writers.

2. *Symptomatology of the Lumbosacral Group*

In general we have met with two groups of cases: those who present the clinical picture characteristic of sacro-iliac or low back strain, and those who present the picture of cauda equina tumor.

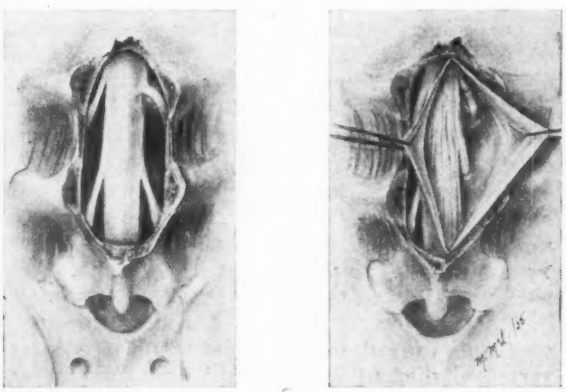

FIG. 8. Ruptured disc as seen at operation before and after opening the dura. J. M. C., M. G. H. BM No. 16351.

The first group is of the greatest interest in that these patients, suffering intermittently

with severe, and usually unilateral, sciatic neuralgia, often show no abnormality on examination, and are otherwise well. In spite of the lack of signs an exact diagnosis is often possible and operation may be conscientiously offered. The hernia will be found well out in the foraminal notch in cases where the signs are few. *These cases comprise more than one-half of our entire series.*

The second group consists of a few cases where the hernia has presented near the midline, compressing nerve roots going to both extremities, causing serious motor and sensory loss and usually paralyzing sphincters also. In these a presumptive diagnosis of tumor is at first entertained. The prognosis from operation varies with the amount of degeneration already present.

It will be observed in the accompanying table 1 that herniated discs have been found by others with the same frequency in the cervical and lumbar spine. In our series the lumbar spine appears most vulnerable; in fact we may single out a single disc as the point of greatest weakness, *as nearly 50 per cent of all our hernias implicated L 4—5 disc.* (Fig. 9.) This discrepancy requires explanation. Of the twenty-three cases involving the lumbosacral spine twelve have been observed in the past eighteen months. It has been largely through the coöperation of members of the Orthopedic Department, to whom we are greatly indebted, that a number of these patients, often refractory to treatment for sacroiliac and lumbosacral strain, have been reconsidered and proved to be cases of ruptured intervertebral disc by spinal fluid and lipiodol examination. It is significant that *in eight of these cases no neurological abnormalities could be found,* and therefore they usually would not have come to the attention of neurologist or neurosurgeon.

TABLE 1

LOCATION OF RUPTURED DISC IN 81 CASES

	Cervical	Thoracic	Lumbar
Compiled by Alpers et al.[2]	16	6	13
Additional—			
Mauric[13]	1	2	3
Adson[1]	1		
Peet et al.[15]	1		1
Werthemann et al.[20]		1	
Harkins[11]			2
	19	9	19
Our Series	8	3	23
	27	12	42

Collected cases from the literature to which those of this series have been added. Note the preponderance of lumbar cases in this series.

3. *Symptomatology of the Cervicodorsal Group*

The symptoms and signs produced by disc hernias in this portion of the canal simulate those produced by tumors lying anterior to the spinal cord, nor is it always possible to differentiate these cases and intramedullary tumor on purely clinical data. Without the evidence of spinal fluid findings even neurosyphilis and multiple sclerosis may reasonably be entertained as possible diagnoses.

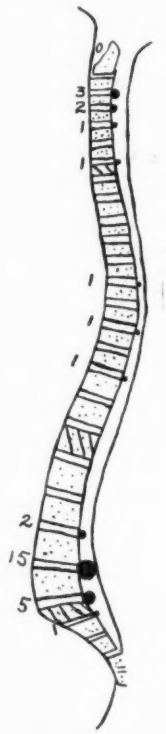

FIG. 9. Diagram showing location of the lesion in thirty-three operated cases.

Characteristic of this group is progressive spastic paraplegia with minimal sensory loss below the lesion, capped by an ill-defined but obvious zone of hyperalgesia. At the cervical level pain in the neck, at thoracic levels pain in the back, radiating upward and downward, but usually not radicular in type, characteristically occurs early, but often subsides, and is not the predominant symptom for which the patient seeks relief.

Of importance in differential diagnosis is the absence of ataxia and signs of disturbance of the posterior columns in the cervically placed hernias, a point stressed by Stookey and by Elsberg and noted in the case records of others. The presence of ataxia in all three of our cases with thoracic hernias should be noted. Pain and temperature dissociation was not encountered with such frequency as to stress this sign as of diagnostic significance.

4. *Spinal Fluid*

Again and again the significance of spinal fluid examination has been forced upon us. While all of the tests are of value in excluding diseases which might resemble disc hernias, we have come to rely upon two as of paramount im-

portance, quantitative protein determination and dynamic tests for block. So constant is protein increase in these cases (thirty-three out of thirty-four cases), even when the fluid is obtained from above the hernia, that we are greatly influenced by this finding. That the protein increase is slight or moderate in most cases is of significance in differential diagnosis, but in a few cases where it was possible to puncture below lumbar hernias a high protein content was obtained. The protein figures for cervicothoracic spine hernias were never high.

Subarachnoid block is almost always partial only, and occasionally fails of demonstration. In the cervicodorsal cases block was satisfactorily demonstrated in eight of eleven cases. In two cases block could not be demonstrated by lumbar puncture alone, but was apparent on combined cistern lumbar puncture.

In the lumbosacral group the size and position of the extruded fragment seen at operation would hardly be expected to cause block, even if it were possible to insert a needle below. The absence of block is therefore of relatively less significance here than where the hernia compresses the spinal cord.

5. *Lipiodol*

In some cases, both of cord and cauda compression, symptoms, signs and the demonstration of subarachnoid block were sufficient to indicate laminectomy, and sometimes even to suggest a rupture of the disc as the probable cause. But in the large number of cases to which reference has been repeatedly made, namely half of our cases exhibiting a clinical picture of back strain or sacroiliac strain, the clinical picture is not enough, nor is the finding of increased protein enough to subject a patient to a major operation. In these cases visualization of the disc hernia is considered by us not only an accessory finding but one of paramount importance. If the technique is correctly carried out, using enough lipiodol (5 cc.) with care that the mass is not broken up, if the patient is examined prone and films taken at the appropriate angle to show the hernia, this test may well be said to be pathognomonic of the lesion.

TABLE 2

END RESULTS TO DATE IN ALL CASES OF THE SERIES

		Well	Improved	Unimproved	Death Postop.	Since Died	Recent or Untraced
Cervical	8	0	5	1	0		2
Thoracic	3	0	1	2	0	2	
Lumbosacral	23	8	12	0	1	2	2
		8	18	3	1	4	4

Absence of lipiodol evidence of hernia may also be considered as of significance. Two cases were explored in which it was lacking. In neither one was a disc hernia present.

6. *Treatment and Results* (Table 2.)

We believe that the treatment of this lesion is laminectomy with removal of the extruded disc fragment.

The results of operations performed in the cervical region are moderately satisfactory. Few of these patients are entirely relieved of symptoms, though many of them are enabled as the result of operation to lead useful lives.

The results of removal of the herniations in the lumbar region are much more striking. In every case but one the pain in the leg was relieved at once and in this case there was partial relief. Some of the patients complain of weak back, but in the main they are well and carrying on their previous occupation.

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THE SYNDROME OF ANEMIA, GLOSSITIS, AND DYSPHAGIA*

Report of Cases

BY W. B. HOOVER, M.D.†

THE syndrome of anemia, glossitis and dysphagia has been recognized only of recent years. A brief review of the literature will be given, and the cases seen in the Lahey Clinic in the past four years will be reported with a few comments.

[1]Plummer early noted the association of anemia and dysphagia in women. The latter was considered a hysterical manifestation. [2]In 1919, A. B. Kelly described the syndrome under the title of "Spasm at the Entrance of the Oesophagus." Spasm was stressed because of the fact that on the passage of the esophagoscope, the folds of the narrowed esophagus gave way without undue pressure, and the treatment consisted of dilatation. [3]Paterson described the condition at the same time in a paper entitled "A Clinical Type of Dysphagia." He particularly stressed the tongue devoid of papilla, changes in the mucosa and bands in various positions across the opening of the esophagus so that the opening was irregular, or an obliquely placed slit, and not always in the median line.

[4]In 1922, Porter P. Vinson reported sixty-nine cases of "Hysterical Dysphagia." Since this report, the syndrome of anemia, glossitis, and dysphagia has frequently been referred to as the "Plummer Vinson Syndrome." Vinson noted splenomegaly in twelve of these sixty-nine cases. He did not find changes varying from the normal in the upper portion of the esophagus. His treatment consisted of dilatations, a liberal diet with iron and arsenic for anemia, and reassurance.

In 1926, Moersch and Conner also reported on sixty-five cases all in women. Glossitis was seen occasionally, the mucous membranes of the mouth were atrophic and dry, but webs or other membranous obstructions were not noted in the upper end of the esophagus. Splenomegaly was again recorded in twenty of the sixty-five cases. Achlorhydria was present in eight cases out of ten instances in which a gastric analysis was performed. Paresthesia of extremities was a feature in five cases. Their treatment was the same as that suggested by Vinson but they noted that in some cases the anemia preceded the dysphagia, an occurrence which was not in accord with Vinson's view that the anemia was due to an improper diet following dysphagia.

[6]A. F. Hurst in the same year reported a case in which it was impossible to pass the esophagoscope or mercury bougie, owing to "a tight spasm of the sphincter." This case had a "streptococcal glossitis" and an anemia which preceded the dysphagia by two years. Improvement resulted following the administration of iron.

[7]Ryle reported another case in 1927, of esophageal spasm with severe anemia, and a recurrent ulceration of the tongue which the author thought to be a "streptococcal glossitis". The dysphagia was thought to be hysterical. The anemia responded to treatment with iron and arsenic, and the dysphagia was relieved by esophagoscopy.

[8]Jones and Owen also in 1928 reported on a series of cases. They recorded webs and membranes across the lumen of the esophagus, but also noted that the esophageal opening was lax without sphincter-like action occasionally. In 1929 [9]Cameron reported twenty-five cases of this syndrome. Hydrochloric acid was present in the gastric content of all eleven cases in which an analysis was made. Dysphagia was preceded by anemia in five of his cases and the reverse was true in fifteen of his cases, and the remaining five a definite statement could not be made of the sequence of symptoms. Cameron stressed the possibility of malignant change at the upper end of the esophagus in women with this syndrome.

From 1929 to the present time there has been a great interest in anemia and numerous articles have appeared, under the titles of "Simple Achlorhydric Anemia" or similar titles (see titles listed below), by the following authors: [10]Kaznelson, Reimann and Weiner; [11]Altschuller, [12]Witts, [13]Waugh, [14]Mettier and Minot, [15]McCann and Dye, [16]Adamson and Smith, [17]Davies, [19]Mills, [20]Dameshek, [21]Hare, [22]Hurst, [23]Haden, all describe a type of anemia with achlorhydria. Some of these observers have noted enlargement of the spleen, a sore mouth, atrophic tongue, and dysphagia to be occasionally present among their cases.

Returning to the reports of cases in which dysphagia and glossitis are important factors [24]Evans, in 1930, advanced the view that the underlying cause of this syndrome was tertiary syphilis of the third or fourth generation, but in view of a review of the literature, it would seem that his arguments are not well grounded.

Witts in 1931 gave a short review of the literature and reported the finding of this syndrome in thirteen instances. He pointed out the close correspondence between this syndrome and achlorhydric anemia. His conclusions were that the disease was not the result of streptococcus infection, that the anemia was not produced by dysphagia, and that the symptoms were not

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Number	Sex	Age	Complaint	Reason Sent to Clinic	Hgb.	R.B.C.	W.B.C.	Smear	HCl in Stomach	Eso F
1	F	32	Dysphagia 6 years	? Goitre	57	3,910,000	5,100	Normal appearing cells	Not permitted	Not perr
2	F	32	? Goitre Dysphagia	? Goitre	55	4,990,000	11,200	Achromia	Not examined	Not mad
3	F	51	Dysphagia 10 years	Adenomatous Goitre	50	4,680,000	5,200	Achromia; variation in size	0	Bar Eso copy
4	F	63	Dysphagia 20 years	Ad. Goitre ? toxic BMR +24	70	5,110,000	9,450	Normal appearing cells	0	Bar pass Neg
5	F	44	Dysphagia 6 mos.	Ad. Goitre	49	3,090,000	12,000	Marked achromia; var. in size	0	Nar Req to I
6	F	60	Dysphagia 20 years	Dysphagia	45	4,080,000	4,200	Some variation in size	0	Neg
7	F	48	Goitre Dysphagia	Goitre	45	2,900,000	10,200	Achromia; slight var. in size	0	Web with scop
8	F	40	Swel. neck Dys. 3 yrs.	? Goitre	29	3,840,000	4,150	Marked achromia	0	Nar Dila blee
9	F	46	Dysphagia 6 years	Dysphagia loss of wt.	70	3,840,000	7,600	Slight variation in size	Tube not passed	Fibr Stri
10	F	43	Dysphagia 6 years	Dysphagia	57	4,320,000	8,500	Achromia; sl. var. in size	0	
11	F	43	Dysphagia 5 years	Dysphagia ? Goitre	50	4,470,000	7,400	Marked achromia	Not examined	Not mad
12	F	53	Choking Dys. 2 yrs.	? Goitre	55	4,590,000	6,400	Achromia	Not examined	Fib. and Web
13	F	60	Dysphagia	? Goitre	57	3,800,000	3,450	Achromia; var. in size	Tube not passed	Web
14	F	54	Dysphagia	Dysphagia 2 years	54	4,160,000	1,450	Achromia	Passed after dilatation. Small amt. free HCl	Web
15	F	41	Dysphagia 4 years	Goitre	47	3,760,00	8,750	Achromia	Free acid after dilatation; small amt.	Web
16	F	42	5 years Dysphagia	Menorrhagia 8 years Dysphagia	30	3,170,000	4,600	Marked achromia	Free acid	Web
17	F	41	Dysphagia 3 years	Dysphagia	46	4,840,000	5,400	Achromia; var. in size	0	Web

W.B.C.	Smear	HCl in Stomach	Esophageal Exam.	Tongue	Spleen
5,100	Normal appearing cells	Not permitted	Not permitted	Atrophic	0
11,200	Achromia	Not examined	Not made	Smooth	
5,200	Achromia; variation in size	0	Bar. passed Esophagoscopy Web.	Smooth	Palpable
9,450	Normal appearing cells	0	Barium passed Negative	Smooth	Palpable
12,000	Marked achromia; var. in size	0	Nar. Esoph. Req. Press. to Dilate	Smooth	0
4,200	Some variation in size	0	Negative	Smooth	0
10,200	Achromia; slight var. in size	0	Web. with scope	Smooth	0
4,150	Marked achromia	0	Nar.; Dilat. bleeding	Smooth	0
7,600	Slight variation in size	Tube not passed	Fibrous Stricture	Slightly atrophic	0
8,500	Achromia; sl. var. in size	0		Smooth	0
7,400	Marked achromia	Not examined	Not made	Smooth	0
6,400	Achromia	Not examined	Fib. Strict. and Web.	Atrophic	0
3,450	Achromia; var. in size	Tube not passed	Web.	Atrophic	0
1,450	Achromia	Passed after dilatation. Small amt. free HCl	Web.	Atrophic	0
8,750	Achromia	Free acid after dilatation; small amt.	Web.	Atrophic	0
4,600	Marked achromia	Free acid	Web.	Atrophic	0
5,400	Achromia; var. in size	0	Web.	Atrophic	0

Spleen	Other Positive Findings	Other Symptoms
0		
		Fatigue
Palpable	Adenomatous goitre BMR —6	
Palpable	Prolapse uterus Mitral stenosis	Dyspnea numbness fingers
0	Goitre BMR —6	Fatigue abdom. distress
0	Arterioscler. var. veins	Debility constip.
0	Pelvic tumor lac. pel. floor	
0	Cystoc.; rectoc.; goitre	
0	Malnutrition	Hoarseness fatigue
0	Adenoma of thyroid	
0		Palpit. dyspnea
0	Endo-cervicitis	Goitre removed
0		Indiges. gas
0		Cramps dizzi-ness
0	Adenoma of thyroid	Cough consti-pation
0	Pelvic exam. negative	Menor-rhagia
0		Fatigue

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the result of syphilis. His treatment consisted of a dilatation by the passage of bougies, and the anemia and glossitis usually improved following the administration of iron. He further noted that the administration of liver and dilute hydrochloric acid and the vitamin preparations, did not seem to influence the anemia, glossitis or dysphagia.

[25]Paterson confirmed his findings of 1919, and still held the view that the obstruction of the esophagus was due to spasm. He also stressed the frequency in which malignant growth developed in this syndrome. R. S. Johnson, in discussing Paterson's paper, pointed out that the dysphagia cleared up following bougies, but that the change in hemoglobin concentration was very slow or did not take place at all unless liver extract and iron were given in large amounts. Achlorhydria was present in Johnson's cases.

[26]Suzman in 1933 reports eight cases from the Massachusetts General Hospital. His paper is unique in that he is able to give the autopsy findings in one case. His comments on the findings in part are as follows: "From the gross findings, it is evident that a real obstruction, brought about by raised folds of mucous membrane, was present.

"The mucosa and muscle of the tongue and esophagus showed definite histological abnormalities consisting chiefly of hyperkeratinization of the epithelium, with areas of desquamation, and of degenerative, atrophic changes in the underlying muscle. Although there was a moderate degree of infiltration of the submucosa with lymphocytic like cells, on the whole, the condition did not appear to be inflammatory. The possibility that the hyperkeratinization of the epithelium may have been dependent on a deficiency of Vitamin A, is offset by the detection of significant amounts of this substance in the liver. The presence of areas of mucous membrane stimulating leukoplakia, and containing immature cells, exhibiting mitosis, is of interest in view of the tendency of malignant disease to develop.".

One of Suzman's cases developed carcinoma in the pharynx and tongue but not of the upper end of the esophagus. This possibility of carcinomatous change has been emphasized by a number of observers. This is the only case of actual malignant change that I have found recorded in a patient with this syndrome. Suzman did not find changes in the intermuscular nerve plexus such as were suggested by Cameron, Hurst and Kelly to explain spasm as an etiologic factor in producing dysphagia. In view of the well-marked gross and microscopic lesions found in the pharyngoesophageal region in the specimen of his case "it seems unnecessary that hysteria be considered in the etiology of this disease". Recognizing the relation of simple achlorhydric anemia to this syndrome, Suzman states, "The Dysphagia, it seems, is merely a complication or concomitant manifestation of this already well recognized form of anemia and there does not appear to be sufficient reason to regard this so-called 'Plummer Vinson Syndrome' as a separable clinical entity. From an etiological standpoint therefore, this syndrome may be considered simply one that may arise in idiopathic hypochromic anemia."

REPORT OF CASES AND COMMENTS

For the sake of brevity the accompanying table is given which illustrates quite graphically the principal points in the history, the physical examination, and the laboratory findings in seventeen cases presenting this syndrome, comments and further notes will be given in the text.

It is to be noted that all of these patients are

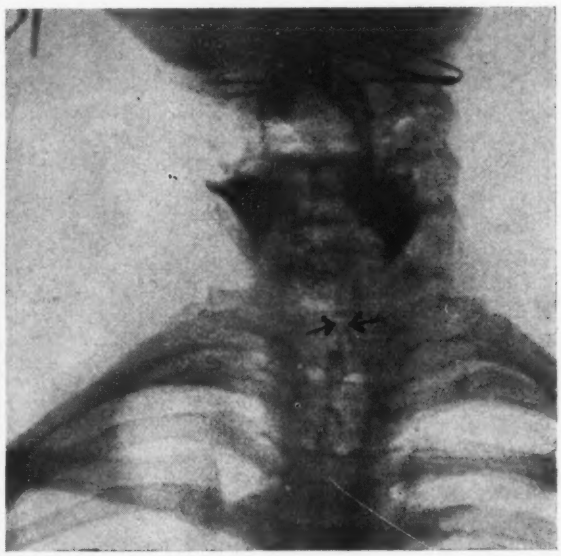

FIGURE 1. An anterior-posterior roentgenogram of the upper end of the esophagus showing the narrowed portion indicated by the arrows. Case No. 9 in the table.

women. The average age for the seventeen patients is forty-six years, the oldest being sixty-three and the youngest thirty-two. Very few patients with this syndrome are found among men. Vinson reported twelve men out of sixty-nine cases, the highest per cent reported by any observer.

All of these patients complained of dysphagia and this symptom caused them to seek relief. The dysphagia varied from a marked effort to get food to pass through the esophagus to partial starvation because of this symptom. All the patients had a fear of getting food caught in the throat and choking spells. Therefore, the food was well masticated or prepared with grinders or sieves. Eating at the table with other people became impossible because they could not eat so fast and choking spells would be very embarrassing. This often forced them to eat in solitude and one busy woman did not have the

time it required to get an adequate amount of food. Fluids were frequently used to wash the food down or liquid food was taken.

Eleven of these seventeen patients presented themselves to the Clinic with the belief that they had thyroid disease which caused the difficulty in swallowing and on examination six had adenomatous changes in the thyroid gland coincident with the syndrome of anemia, etc., but in no instance could the thyroid enlargement account for the difficulty in swallowing.

Weakness, fatigue, shortness of breath and "no pep" were common to practically all. Gastric distress was present in two cases. Practically all had other positive findings which gave symptoms.

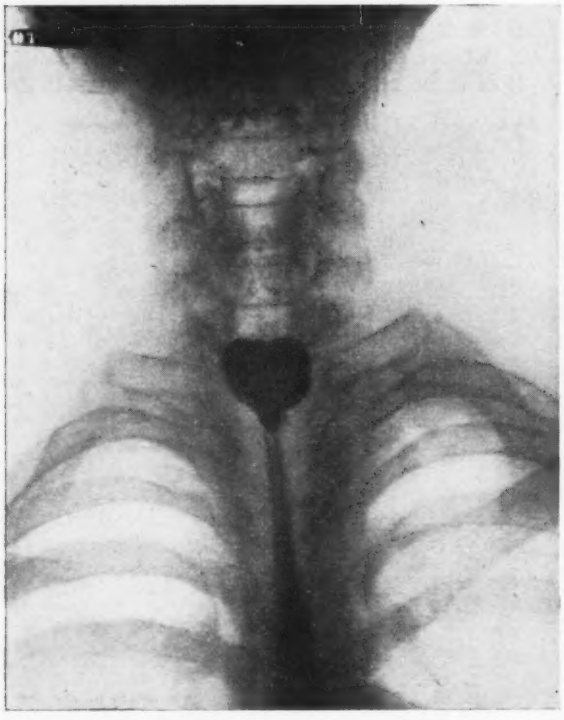

FIGURE 2. Anterior-posterior roentgenogram of the upper portion of the esophagus. Case No. 13 in the table, showing narrowing at the region of the web.

Anemia was known to be present by some of the patients and treatment had been given without results due to failure on the part of the patient to continue or because an inadequate amount of iron had been prescribed. None of the patients were apparently concerned by the presence of their anemia state.

Physical examination shows a patient of middle age or older with sallow skin appearing tired or fatigued and one is immediately impressed by the fact that the patient is below normal in general health and appearance.

The mucous membranes of the mouth and the conjunctivae are pale. The membranes of the pharynx are more dry than normal, slightly shiny and apparently thin. An actual acute glossitis was not seen in any of these patients, and these patients did not have pain even on manipulation of the tongue. There was little complaint even though there were fissures present at the corners of the mouth.

Examination before the fluoroscope with the thick barium mixtures shows variation from slight hesitation to marked obstruction (see figure 2) at the upper portion of the esophagus.

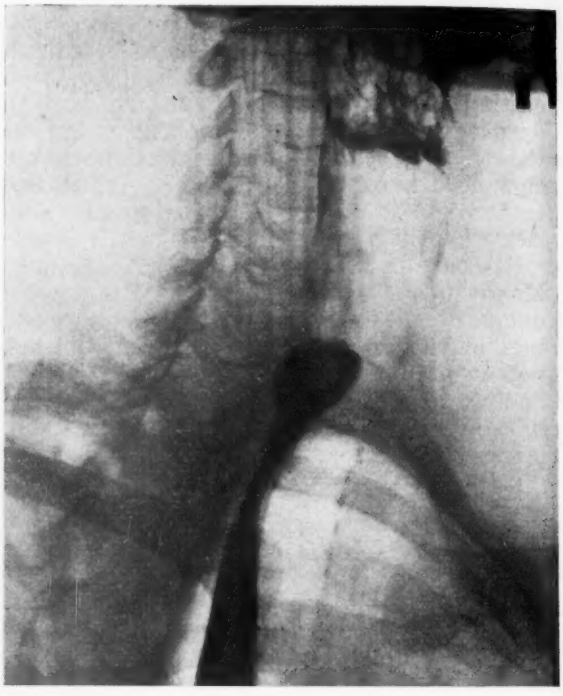

FIGURE 3. Lateral roentgenogram of the upper end of the esophagus, Case No. 13 in the table, showing the niche made by the web in the barium at the upper end of the esophagus.

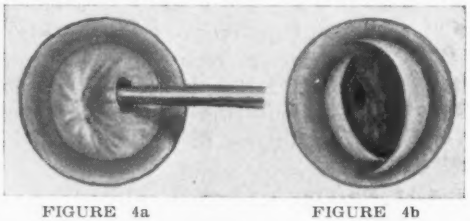

FIGURE 4a FIGURE 4b

FIGURE 4. a, the esophageal appearance of the web. Case No. 13, showing the opening in the web through which an instrument was passed and brought against the under surface of the web. The web was so thin that it was transparent. b, shows the type of folds of partial web as seen in some cases, this one in Case No. 7 in the table. These webs are often attached to the posterior or lateral portion of the cricoid and pass backward around the upper end of the esophagus at the lowermost portion of the hypopharynx.

Examination with the esophagoscope and esophageal speculum shows the mucous membrane of the hypopharynx and esophagus similar to that of the pharynx. In two of the cases, no obstruction was encountered to the passage of the instrument. In four others a definite narrowing was present and pressure was necessary to pass the scope through the cricopharyngeal region and the upper inch of the esopha-

gus. This produced some cracking and abrasion of the membranes. Of these resistant cases, one required the passage of graduated dilators to produce an adequate lumen in the esophagus. In seven cases a definite band or web was seen at the upper portion of the esophagus. One web was so complete that it narrowed the lumen of the esophagus to about four millimeters and was so thin that one could see an instrument through it when placed against the under surface. (See figure 4a.)

The passage of the esophagoscope not only aids in the diagnosis but the dilatation produced by its passage relieves the dysphagia in most cases. Gastric analysis was made in eleven instances and in eight there was absence of free hydrochloric acid; in two there was a small amount; in one a normal amount. In seven cases an attempt to pass a stomach tube for gastric analysis was unsuccessful before dilatation. In six of these cases the attempt was repeated after dilatation with success. One patient would not permit the passage of the tube and in four others it was not attempted.

The spleen was palpable in two cases on routine abdominal examination. No special effort was made to palpate the spleen in any of the cases. The blood examination showed a hemoglobin varying between 29 per cent and 70 per cent. The red blood cells varied between 2,910,000 and 4,990,000 and the highest white blood cell count was 12,000 and the lowest 1,450. Measurements of the cells were not made but in some smears variation in the size and shape of the red cells was noted. Achromia was marked in practically all the smears.

As to the relation of anemia to the dysphagia, it is my impression that the atrophic process predisposed to web formation and fibrosis, yet it is to be remembered that we see many cases who have the anemia but do not develop dysphagia and further that others develop webs and fibrosis without anemia.

The treatment consists of two parts: the mechanical and anti-anemic. The dilatation can usually be carried out successfully at the time of the esophagoscopic examination but if this fails gradual dilatation can be carried out by passing dilators of gradually increasing size over the previously swallowed thread as suggested by Vinson in cases of esophageal stricture.

The dilatation which is so effective in relieving the dysphagia has very little effect on the anemia as was noted in case 10 in the table. This woman lived in a distant village. Her physician was instructed in carrying out her anti-anemic regimen but since she swallowed readily, and that having been her chief complaint, she neglected this part of her treatment. When seen one year later after a vacation on the beach where her diet was ideal and living conditions were excellent her hemoglobin was only 55 per cent.

Dysphagia may recur as further webs or bands may be formed and atrophic process continue especially if the anti-anemic treatment is neglected. Further dilatations will quickly relieve this symptom.

FIGURE 5. Microphotograph of a section made from the web in Case No. 13, which was removed from the esophagus with punch forceps. This web consists of two layers of mucous membrane with a small amount of fibrous tissue between them. The mucous membrane has separated partially from the fibrous tissue, especially in the lower portion.

FIGURE 6. Photograph of Case No. 14 in the table, showing a smooth tongue and fissures at the corner of the mouth.

The anemia responds to the administration of iron salts in large doses. [27]Murphy states that the optimal dose is that which supplies 500 mg. of iron daily and he finds ferric ammonium citrate and ferrous carbonate the most effective of the iron salts, the dosage of 3 Gm. per day of the former and 5.4 Gm. of the latter will yield this amount. This dosage has been found satisfactory in our cases.

The treatment with liver alone is disappointing. Some early cases were given liver without a rise in the hemoglobin percentage. Following the use of iron in combination with liver the percentage of hemoglobin increased.

[27]Murphy has found that the combination of iron (ferric ammonium citrate) in adequate dosage with the intramuscular injections of solutions of liver extract (Lederle) produced the most rapid "improvement in anemia of the hypochromatic type". Once the hemoglobin has reached normal it is necessary for the patient to continue a diet with a high iron content, fresh fruits, green vegetables, liver, etc. or even take an amount of iron in the form of an iron salt in sufficient dosage to prevent a decrease in the hemoglobin of the blood and maintain the iron metabolism of the body. There is a great tendency in these patients once the dysphagia is relieved to forget to take the iron and if the slightest abdominal distress occurs the patient gives the iron credit for the distress, the result being the discontinuation of iron medication.

Without careful follow-up the patient may not get a satisfactory increase in the hemoglobin or a relapse in the anemia may occur due to carelessness on the part of the patients. When difficulty in swallowing occurs it is so distressing that they seek further relief. In all the patients who have carried out instructions in medication there has been rapid increase in the percentage of hemoglobin. The anti-anemic treatment improves the appearance of the tongue as a rule. The fissures at the corners of the mouth rapidly improve without special attention being directed to them. In one instance the anti-anemic treatment relieved the dysphagia without the dilatations. This was in a young women without severe dysphagia.

If there is obvious infection in the nose or mouth this should be cleared up.

Recently Hutter, Middleton, and Steenbock[28] have reviewed the recent writing on the atrophic tongue and with some experimental work and clinical investigation conclude that the smooth tongue most probably is due to a deficiency in diet or the inability of the patient to absorb Vitamin B. In view of this work I have given yeast to a few patients but cannot as yet make a definite report as to its efficiency.

SUMMARY

A brief review of the literature on the syndrome of anemia, glossitis and dysphagia is given. The anemia is recognized as that reported as "Idiopathic Hypochromatic anemia" and so forth. The glossitis may more properly be described as an atrophic tongue and does not differ from that described in connection with other diseases. The dysphagia is often due to mechanical obstruction of the upper portion of the esophagus. Seventeen cases of this syndrome are reported. The treatment consists of mechanical dilatations and the prescription of iron salts in adequate dosage with or without liver. The need of careful follow-up is emphasized.

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EPIDEMIC BENIGN MYALGIA OF THE NECK*

BY BENEDICT F. MASSELL, M.D.,† AND PHILIP SOLOMON, M.D.†

THE purpose of the present paper is to report the high incidence in Boston during the past two months of a condition which appears to be an infectious myalgia of the neck. The attention of the writers has been forcibly attracted to this condition since each of us has suffered from it personally.

PROCEDURE

Three hundred individuals, chosen at random, were questioned as to the presence during the past two months of "stiff neck", or "sore neck" in themselves or their immediate acquaintances. A majority of the persons questioned were doctors, nurses, and hospital employees, but members of other walks in life were also included. Adults only were chosen, the age variation being roughly twenty to seventy years. When an individual was encountered who had had the symptoms in question, the following data were ascertained: date of onset (as well as could be remembered); time of day of onset; location, severity, and duration of the symptoms; interpretation of cause of the symptoms; incidence of such symptoms in the past, and the treatment employed.

RESULTS

Of the 300 individuals questioned, fifty-two (17.3 per cent) had the symptoms in question within the past two months. The time of onset is shown in figure 1. It can be seen that an accurate recollection of the date of onset was rarely available after an elapse of two weeks or more. Answers such as "about two months ago", "last month", and "two weeks ago" were frequently obtained. It is probable that were the exact date of onset known in each case the distribution would be more even.

In addition to the fifty-two positive cases personally interviewed, the authors have knowledge of sixty-one other cases of "stiff neck" which have occurred in Boston within the past two months. Twelve of these came to the Out-Patient Department of the Boston City Hospital with pain and stiffness of the neck as their chief complaint. The remainder were relatives or friends of the group interviewed. It is probable that these cases represent only the more severe ones; many more may have been present among the acquaintances of the group interviewed, but were not severe enough to warrant their talking about the trouble.

The description of a typical case follows:

The patient, a physician, was awakened from a sound sleep at 5:00 A.M. on June 26 by a severe pain in the left side of his neck. The pain was neither dull nor sharp, but "somewhere between the two". It was definitely made worse by motion, especially by rotating movements of the head. It seemed to be deep in the tissues of the neck near the occiput. Palpation elicited no single spot of localized tenderness, but deep pressure was very painful over the whole left side of the neck, along the border of the trapezius muscle, and especially just below the occiput. The patient was unable to lie comfortably in any position, and could not fall asleep again. He interpreted his symptoms as possibly being due to a subluxation of a cervical vertebra which somehow occurred in his sleep. Several hours later he consulted a surgeon, who examined him carefully and thought that the condition was a myositis, chiefly of the trapezius and splenius muscles. The pain had diminished somewhat, but the tenderness was unchanged. There was no malaise, headache, fever, or other symptoms. Baking and massage were recommended, but the patient, with the typical lax attitude which physicians often take toward the treatment of their own illnesses, did nothing. The next day the pain had almost entirely disappeared, but rotating movements of the head were still quite painful, especially to the left. The third day, the pain was gone, but could be brought back by extreme rotatory movements of the head to the left. The condition has persisted at this stage to the present (July 6).

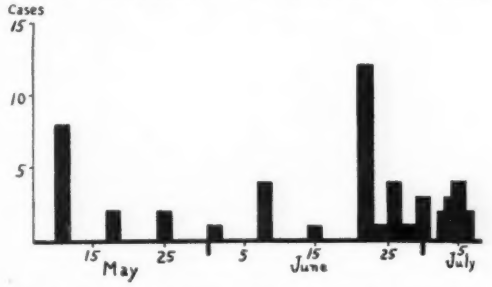

FIGURE 1. The date of onset of 52 cases of myalgia of the neck, May-July, 1935.

The case described above was perhaps more severe than the average, although many were severe enough to be incapacitating for the first twenty-four hours. In almost every case, the patients were in perfect health at the time of onset of the symptoms. The nearly complete absence of associated symptoms was remarkable. The patients were not ill, in only a few cases was headache present, appetite was not interfered with, and sleep was prevented only in the rare case where the pain persisted and was sufficiently severe to make the assumption of a comfortable position impossible. In the great majority of the cases the symptoms were first

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noticed on awakening in the morning. In a few instances the symptoms were practically gone by noon, but in most cases they persisted for twenty-four to forty-eight hours, and then continued in a mild form for several days or weeks thereafter. Recurrences were not uncommon, but were never so severe as the original attack.

The location of the pain can best be explained by referring to figure 2. The pain was uni-

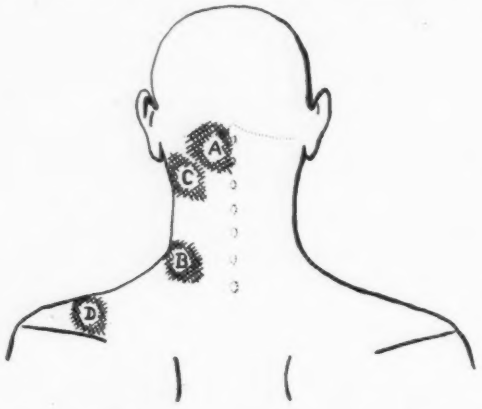

FIGURE 2. The common locations of the pain in myalgia of the neck. For explanation, see text.

lateral in almost every case. The left side was somewhat more frequent than the right. The favorite site for the pain was at A, just below and to the side of the occiput, along the origin of the trapezius muscle at the superior nuchal line. The next most common site was at B, halfway down the neck along the border of the trapezius muscle. Other sites for the pain were at C, the insertion of the sternocleidomastoid muscle, and D, the lower border of the trapezius at the shoulder. In a few cases the patients thought they had a sore throat until they realized that the pain was not in the throat but deep in the muscles of the neck. One patient had very deep-seated pain accompanied for a short time by pain on swallowing. In the cases examined, nodules or extremely localized tenderness could not be felt. The pain often was more generalized in the side of the neck than is shown in figure 2. Movement of the involved muscle invariably caused severe pain, so that the patients were wont to walk about "stiff-necked", turning the whole body rather than the head in order to look to the side.

The interpretations which the patients gave for the cause of their symptoms were interesting. The majority said, "I thought I must have twisted my neck somehow in my sleep." Others thought they "must have been in a draught" the day before. A few thought that physical activity, such as swimming or tennis, was the cause. Two surgeons thought that a strained position during prolonged operating the day before might have been the cause. It is significant that no one of these patients has been subject to "stiff neck" in the past, or has had this symptom commonly after activity similar to that which he thought might be the cause of the present condition.

The treatment used in the severe cases was heat and massage. Diathermy, infra-red baking, and a variety of liniments were occasionally employed. The heat in every instance seemed to give a measure of immediate relief. The massage, while extremely painful, was followed by a more lasting relief. It is doubtful how much good these measures were for the underlying condition. The cases without treatment ran approximately the same course as those with treatment. No complications occurred, and all cases recovered without residuals.

COMMENT

The high incidence of this condition (greater than one in six) demands attention in spite of the obvious benign character of the symptoms. It is possible, though it would seem unlikely, that at any time of the year one could elicit this same proportion of similar symptoms within the previous two months. If this were so, the fact would be even more interesting and more demanding of further research. It is possible that the explanations offered in the individual cases for the symptoms are indeed the correct ones. But the commonest of these, exposure to draughts on the previous day, has long been the layman's explanation for the onset of the common cold, the true etiology for which is now known to be infectious. A hypothetical twist of the neck during sleep seems hardly plausible enough to warrant serious consideration. Besides, several cases occurred during the day while no physical activity was going on. Physical exertion the previous day, swimming and tennis, admittedly popular at this time of the year, could be offered as an explanation in only a few cases, and in these it was unusual and surprising to the patients to find such acute symptoms as the result of physical activity which was not uncommon to them.

It seems to us quite possible that the etiology of the condition in question is on the basis of an infectious agent. While we are not in a position to offer proof for this hypothesis, there are several considerations which are in its favor. These are the apparent epidemic nature of the condition, the uniformity of the onset, symptomatology, and course, and the absence of other apparent causes. In two instances in this series, patients reported that their wives complained of symptoms similar to but milder than theirs on the day following the onset of their own symptoms. Aside from these instances, there seemed to be no other multiple cases in the same family.

Conditions similar to that described in this paper have been frequently discussed in the

literature under the name of "fibrositis", "myalgia", "myositis", or "muscular rheumatism".[1] Most of the authors have been interested chiefly in the chronic or recurrent form, and particularly in association with articular rheumatism. Very little attention has been given to the acute forms. Epidemics of acute pleurodynia or Bornholm disease have been reported[2], but no reference can be found to epidemic myalgia of the neck. Except for brief discussions in the textbooks, the American physicians have almost entirely ignored the question of muscle pain.

"Stiff neck" has probably always been a common complaint, and the attitude of the public toward it has been one of annoyed tolerance and resignation, much the same as its attitude toward the common cold. But the total amount of pain and suffering occasioned in the community by these minor illnesses is enormous. Further research into the etiology of these conditions is obviously indicated.

SUMMARY

The high incidence in Boston during the past two months of a condition which appears to be an infectious myalgia of the neck is reported. Of 300 individuals questioned, fifty-two, or 17.3 per cent, had the symptoms in question. The condition is described and attention is called to its apparent epidemic nature at present.

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COEXISTING INTRAUTERINE AND EXTRAUTERINE PREGNANCY

BY HENRY H. FAXON, M.D.*

COEXISTING intrauterine and extrauterine pregnancy is an unusual although not extremely rare finding. The first reported instance of this condition was recorded by Duverney in 1708. His diagnosis was made at autopsy, the mother having died in the third month of pregnancy as a result of rupture of the extrauterine sac.

A number of efforts have been made to correlate separately reported cases and three exhaustive reviews of articles dealing primarily with the group as a whole have been published by Novak (1926), Stein (1928) and Gemmell (1933). Although there are certain minor differences in these reports, due chiefly to each author's discrimination as to which published cases should be included in his series and to the time of publication, they agree essentially as to the findings derived from statistical evidence. As a matter of interest the following observations, based on the above reviews, are given by way of introduction.

There have been approximately 250 cases of coexisting intrauterine and extrauterine pregnancy reported. Ten per cent of these might well be excluded as representing instances of intrauterine pregnancy superimposed upon a tubal or intra-abdominal pregnancy that occurred from one month to many years before. Thus, the finding of a lithopedion in conjunction with a normal gestation represents what has better been termed a "compound" than a "combined" pregnancy. In all save the ten per cent noted, impregnation of the tubal and of the uterine ova took place presumably within a short time of each other. In no instance has there been convincing evidence to show that ectopic conception occurred after intrauterine pregnancy was established.

In sixty per cent of the cases the mother was between the ages of twenty-five and thirty-five years, with slightly more than half of these cases falling in the latter five-year period.

Thirteen per cent of the cases occurred in nulliparae while fifty-four per cent of the women had previously borne one, two or three children. In six of the cases there was a history of previous multiple intrauterine pregnancies, but save for this finding, no evidence was advanced to show any causal relationship between previous pregnancies and the occurrence of coexisting intrauterine and extrauterine pregnancy.

The symptoms complained of early in the course of the condition were usually attributable to the tubal pregnancy, while those in the latter months were more commonly the result of the intrauterine gestation. The condition was

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diagnosed preoperatively in but seven per cent of the cases. In forty-three per cent of the cases the diagnosis was made before abortion of the uterine ovum while in twenty-two per cent it was after this had occurred. Nine per cent were diagnosed in the second half of pregnancy while in nineteen per cent it was only during the puerperium that the presence of an associated ectopic pregnancy was discovered. The earliest reported cases were invariably discovered at postmortem examination.

Operation was carried out on an average of four and a fraction weeks after the onset of symptoms. Preoperative vaginal bleeding antedated operation by three weeks in those cases which later aborted while it had been present 1.6 weeks in the women continuing to term. It is interesting to note that in some of the cases, such as the one I cite below, no vaginal bleeding occurred where presumably both ova were alive until the time of operation. This finding is in keeping with Novak's belief that it is the death of the ova with the resulting upset in ovarian hormone balance which precipitates vaginal bleeding.

The treatment in these cases has been determined largely by the duration of the pregnancy and the physical findings at the time the diagnosis is made. With rupture of the tube and intraperitoneal hemorrhage, immediate laparotomy is the generally accepted form of treatment. In those cases in which the ectopic gestation is definitely diagnosed in the early months, operation for its removal is likewise indicated. However, operation in cases in the latter half of pregnancy in which it can be shown that the extrauterine fetus is still viable, should be delayed until term at which time both babies should be delivered by abdominal section. Otherwise, the treatment of the intrauterine pregnancy is governed by the same rules of procedure as in cases unassociated with a coexisting tubal pregnancy and depends largely on whether the former proceeds in a normal manner or is attended by complications.

The maternal mortality for the entire group was twenty-one per cent. The ninety-three cases that were operated upon before abortion of the uterine ovum showed the lowest figure of ten per cent, whereas the small group of twenty cases in which the condition was diagnosed between the fifth month of pregnancy and term reached the highest figure of thirty-five per cent. In those patients in whom the extrauterine pregnancy was discovered after uterine abortion or normal delivery, the maternal mortality was fifteen per cent.

A living child was delivered from the intrauterine pregnancy in thirty-five per cent of the cases, and in cases in which the intrauterine pregnancy did not survive, seventy per cent of the women miscarried at or before the third month. No definite prognostic sign so far as later uterine miscarriage could be made out at the time abdominal section was performed for the ectopic gestation, but trauma in the removal of the offending tube and, to a lesser extent, the finding of a large amount of blood in the peritoneal cavity seemed to predispose toward early spontaneous miscarriage of the uterine products of conception. There have been nine instances reported of living extrauterine babies having been delivered by abdominal section in cases in which the mother was also delivered of a living intrauterine child. The other ninety-six per cent of the ectopic gestations have died at some time prior to delivery. In fifty-three per cent this occurred at or before the third month but in twenty per cent of the cases the extrauterine pregnancy went to term.

REPORT OF A CASE*

Mrs. M. F.: a thirty-nine year old white American housewife, who was first seen by Dr. William Mitchell on March 2, 1934, complaining of lower abdominal pain of one-half hour's duration. The onset of the pain had been sudden and its intensity so severe that she had nearly fainted. It was steady in character and had persisted in unabated form. Previously she had enjoyed the best of health and there were no significant findings in her past history. Her catamenia had begun at fourteen years and her periods were regular and of the twenty-eight day type. Her last period was on January 13, 1934, but she had failed to menstruate as expected in February. There had been no vaginal staining but she had experienced some nausea during the past month which led her to believe she might be pregnant. Two previous pregnancies had been normal, there being one girl of fourteen years and one boy of twelve years, living and well. Since her last pregnancy she had been anxious to have more children but had not become pregnant in the intervening twelve years. At the onset of acute symptoms she was sent at once to the hospital where I was asked to see her.

Examination: Examination showed an extremely pale woman in obvious pain lying quietly in bed. Her lower abdomen, especially in the left lower quadrant, was spastic and extremely tender. The cervix was soft; the uterus was anterior, in the midline and slightly enlarged. The left vault was strikingly more tender than the right, but no mass could be felt. There was no sign of vaginal bleeding. Her blood pressure was 80/40 and her pulse of only 80 was of poor quality.

Preoperative Diagnosis: A diagnosis of ruptured left tubal pregnancy was made and operation under gas-ether anesthesia was done at once.

Operation: The abdomen was opened without incident through a lower abdominal paramedian incision. Fully a liter of largely unclotted blood was encountered free in the peritoneal cavity. The uterine adnexa were readily mobilized and the source of the bleeding was found to be from a one cm. rent in the isthmus of the somewhat distended left Fallopian tube. The uterus was slightly enlarged and I suggested at the time without any great degree of conviction, the possibility of a coexisting intrauterine pregnancy. The extruded products of the ectopic gestation were not discovered in the course of the operation. The left tube was excised and 750 cc. of blood in the peritoneal cavity sponged

*I am indebted to Dr. William Mitchell of Needham Heights, Mass., for his coöperation in assisting me in the presentation of this case.

out, strained through gauze and citrated. The abdominal wound was closed in layers without drainage and the citrated blood reintroduced by gravity into the left antecubital vein. The patient made an uneventful recovery and was discharged from the hospital twenty-three days after operation.

On returning home she continued to show signs of a normal intrauterine pregnancy and to complain of symptoms compatible with this diagnosis. No complications to her intrauterine pregnancy developed and on the nineteenth of October, 1934, Dr. William Mitchell delivered her of a ten pound two ounce girl. She nursed her baby and after an uneventful postpartum convalescence was discharged from the hospital twenty days after delivery.

SUMMARY

1. A statement of the general statistical findings in cases of coexisting intrauterine and extrauterine pregnancy, based on the three most recently published reviews on the subject, is presented.

2. A case in which operation for rupture of seven weeks' ectopic pregnancy was followed seven and one-half months later by delivery of a normal living child and recovery of the mother, is reported in detail.

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CORONARY OCCLUSION IN COMMUNITY PRACTISE

BY DAVID HALBERSLEBEN, M.D.*

THE problem of degenerative vascular disease is frequent in community practise. Coronary occlusion is one of the most striking aspects of such disease. In the majority of cases the treatment consists almost entirely of relief from pain, and abstinence from physical exertion of even the slightest degree for a considerable period of time. Abnormal rhythms and congestive failure must sometimes be combated. The physician's chief contribution with a majority is judgment as to when activity may be allowed, and to what extent it is permissible. The proper decision is of great importance to the patient and his family, and can be made only if the physician appreciates the conditions present.

A good description of the symptoms and pathological findings in a case of coronary occlusion with subsequent myocardial rupture was published in London by P. M. Latham in 1846[1]. The description follows:

> "A gentleman, sixty years of age, inclining to corpulence, had for several years been liable to occasional attacks of severe inflammation of the lungs, requiring copious blood-letting for their cure. In the month of February, 1829, having suffered such an attack during the previous winter, and been relieved in the usual manner, he began to experience a new complaint. This consisted of pain beneath the sternum, suddenly coming and going, attended by pain or numbness down one and sometimes down both arms, and by something more than pain, an indescribable anguish, generally within the chest. The attack would seize him as he walked along the streets; whereupon he would stop, turn into a shop, rest a while, and then proceed. The weather was foggy at the time, and to it he was willing to ascribe his new complaint. But the attacks continued to recur when there was no foggy weather to account for them. In the month of April he suffered two; one on horseback, the other in bed and at night.
>
> "One day, towards the end of the same month, he was suddenly seized with this pain beneath the sternum and down both arms. It was severe and agonizing beyond what it had ever been before: and immediately his aspect became that of a dying man, pale and purple about the lips; his pulse very frequent, and hardly perceptible. In this condition, by the help of stimulants, he was still kept alive three days.
>
> "The state of the heart, as it was found after death, is thus described in the catalogue of the museum: 'The cavity of the right auricle is larger than natural, and its membranous lining is thick and opaque. The tricuspid valve is thickened and its lining opaque. The aortic valves are a little thickened, and there is soft matter deposited beneath the lining of the aorta, just above the valves. The coronary arteries are thickened and there is bony matter deposited between their coats. A rupture of the septum dividing the ventricles has taken place near its union with the posterior wall of the heart, by which a free communication is made between the two ventricles. On the side of the left ventricle the opening is about two inches in length, and of a semi-lunar form. On the side of the right the opening is much smaller and rounded.'
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> "From the description which I have quot-

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ed, it does not appear that the septum had undergone any morbid degeneration, which could be thought to give it a greater liability to rupture than any other part of the heart's muscular structure. But such degeneration was so remarkable in the case which had fallen under my own observation that I could not help desiring a more accurate examination of the preparation of St. Bartholomew's, if after the lapse of seventeen years it were indeed possible. Mr. Paget and Dr. Ormond undertook it for me, with the aid of the microscope, and have obligingly communicated to me what they were able to make out: 'There was much oil swimming on the top of the jar. The texture of the heart was somewhat soft. On the parts about the rupture were many drops of oil, and hereabout the muscular tissue was evidently disorganized, for it appeared as irregular granular cords, without any transverse striae, which elsewhere were well marked. But there was no distinct fatty degeneration of the muscular fibres.'

"It appears then that in this, as in the other case, the septum had undergone a morbid change of structure, rendering it more liable to suffer rupture. But the change was not exactly of the same kind in the two cases."

The primary importance of the sclerosis of the coronary arteries was not fully appreciated, however. Dr. Herrick, of Chicago, beginning about 1912[2], took a leading part in pushing recognition of the disease in its entirety. The first diagnosis made in Boston before death, and proved at autopsy, was as late as 1916[3]. Dr. Samuel Levine's monograph, published in 1929[4], gives excellent descriptions of the disease, and outlines treatment.

The frequency of coronary occlusion has been somewhat of a surprise to me. It seemed worthwhile at the completion of five years of community practice in an outlying portion of Boston, to compare its occurrence with that of a few other diseases of major importance.

Twelve hundred and sixty-five patients have been treated in the five years. Thirty-nine of these have died while under my care, the primary causes of death being as follows:

Coronary occlusion	9
Malignant neoplasm	7
Chronic myocarditis	5
Lobar pneumonia	5
Arteriosclerosis, generalized	4
Cerebral hemorrhage	3
Bronchopneumonia	3
Chronic nephritis	1
Cystitis and pyelitis	1
Intestinal obstruction (old adhesive bands)	1

There have been seven autopsies in this group of thirty-nine deaths.

Coronary occlusion has been the greatest single cause of death in this series, constituting nearly a fourth of the total. If the cases in which the patient had died suddenly, before I saw them, and which had not previously been under my care, were to be included, the proportion would be somewhat higher. For in a large share of such instances, the story as given by onlookers is apt to be typical of coronary occlusion.

Among patients who live, as well as among those who die, coronary occlusion is common. The number of patients encountered having as their chief disease one of an arbitrarily chosen group of fifteen major conditions is listed below. These are all patients who were alive while under my care, so are in addition to the group listed above.

Chronic myocarditis and hypertensive heart disease	32
Diabetes	24
Coronary occlusion	15
Rheumatic valvular heart disease	11
Peptic ulcer	11
Tuberculosis	11
Syphilis	11
Malignant neoplasm	10
Cerebral hemorrhage	8
Acute nephritis	7
Pernicious anemia	6
Lobar pneumonia	5
Acute rheumatic fever and chorea	4
Hyperthyroidism	4
Chronic nephritis	3

Coronary occlusion ranks third in frequency in this list. The two groups containing larger numbers, viz. (1) chronic myocarditis and hypertensive heart disease, and (2) diabetes, include many individuals who in future years will have cardiac infarction.

Of the total of twenty-four cases of coronary occlusion, nine died of the disease while under my care, two died of the disease while under the care of others, and one died later of malignant neoplasm. The remaining twelve are in fair or good health. Five of the eleven deaths from the disease occurred within the first two weeks following the initial occlusion.

The history alone will give an accurate diagnosis more often than not. In most cases it is a history primarily of crushing pain in the front of the chest. There are variations. One woman complained of sudden and terrific pain in the upper dorsal spine. The first day she consistently denied even the slightest pain or heaviness in the front of her chest. But on the second she said that the front of her chest felt a little freer than it had the day before. Vomiting is not uncommon as a prominent complaint, the "acute indigestion" which we still hear mentioned by laymen, and even by physicians.

When seen within a few minutes or a few hours of onset, as the community practitioner is apt to see these patients, the only physical sign

of value may be the drawn or pained appearance of the face. The temperature, pulse, and blood pressure are frequently at their usual levels. But a careful history, carefully appraised, may in fifteen minutes make a reliable diagnosis. The appearance during subsequent hours or days of slight fever, leucocytosis, faster heart rate, drop in blood pressure, precordial friction rub, congestive failure—or even sudden death—will usually confirm the original diagnosis. In only an occasional instance does an electrocardiographic tracing contribute any more toward a sound diagnosis than the history and the ordinary bedside findings. In a few cases in which symptoms, and even the signs, are strongly suggestive of an acute abdominal condition, an electrocardiographic tracing may be of paramount importance.

Since in most cases the diagnosis can be made at the bedside, perhaps with the aid of leucocyte counts at the physician's office, hospitalization is seldom necessary for diagnosis. And it is seldom essential for treatment. Usually it is to be preferred that the patient be kept at home, and not moved. Other members of the family, or a nurse, can give closer attention to the patient than would be given in a hospital, unless special nurses are provided.

SUMMARY

1. Coronary occlusion is a common disease in community practise.
2. Diagnosis and treatment can in most cases be carried out satisfactorily in the home, relieving the burden on hospitals.

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JACOB BIGELOW, M.D., LL.D.*

BY CHESTER E. STELLHORN, M.D.†

JACOB BIGELOW.

"Generous soul,
Whose high ambition marks a loftier goal;
Whose settled eye awaits a distant scene,
Heedless of narrower fields that intervene.
His sure resolve and firm unbending soul,
Nor luring hopes, nor threatening fears control;
Fixed in the high but rough ascent to fame
With ardent step and undivided aim,
Nor bars nor years his progress can abate,
Firm to excel and patient to be great."

ON May 27, 1835 at the annual meeting of the Massachusetts Medical Society, Jacob Bigelow delivered a discourse on "The Self Limited Diseases." The clarity, simplicity and timeliness, together with the quaint and gentle humor of the paper, perhaps explains the profound effect which it exerted. Dr. Oliver Wendell Holmes wrote, "This remarkable essay had more influence on medical practice in America than any other similar brief treatise." It was directed against the universally exaggerated faith in drugs and the heroic therapy of the day. In popular opinion Homeopathy has the credit for bringing about that radical change in therapeutics. Bigelow's paper, however, was actually responsible for the reform.

The author, Jacob Bigelow, was of old New England ancestry. His people came to this country in 1640 and settled in Watertown, Massachusetts. He was born in 1787, graduated from Harvard in 1806, attended medical lectures there in 1808 and graduated from the Medical College of the University of Pennsylvania in 1810. There he studied under the eminent Benjamin Rush who was wont to say to his students, "We can have no reliance on nature, gentlemen. We must turn her out of doors in our practice and substitute for her efficient art." These were not the ideas of Bigelow, as we shall see.

He began to practice in Boston by an association with the elder James Jackson. Years later, when he was asked how, without our modern medical schools, hospitals and clinics he obtained his professional training and knowledge, he replied, "Oh, from my patients." To bring himself before the public he began to write and won the Boylston prize for four successive years.

Botany was his great hobby. In 1812 he gave a public course of lectures on botany to the citizens of Boston. His "Florula Bostoniensis" published in 1814, was very popular. In 1815 he was made a lecturer on Materia Medica at Harvard and in 1817 he was made Professor. Under

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the title of "American Medical Botany" Bigelow published an elaborate series of volumes during the years from 1817 to 1820. This brought him European recognition. The preface to this work contains the germ of many of the ideas which he later elaborated. "Much harm has been done in medicine by the partial representations of those, who, having a point to prove, have suppressed their unsuccessful experiments and brought into view none but favorable facts." Photography and lithography were then unknown and Bigelow invented for his purpose an original method of printing in colors directly from copper plates. The illustrations, some sixty plates and over 6,000 engravings, were all made by Bigelow. Their exquisite workmanship, accuracy and artistic arrangement would grace with distinction a modern herbal. The volumes have become quite scarce and are much sought by collectors.

He became an excellent craftsman in many lines. It is said that he went to every shop, cellar and garret in Boston where the mechanics would allow him and would answer his questions. "He knew what was done and how done by smith, glassblower, clock maker, type caster, printer, moulder and engraver." These forays yielded the material for his early lectures on the application of science to the useful arts. They also lent direction to his tastes and views and led to his participation as a founder of the Massachusetts Institute of Technology.

Bigelow lived to be ninety-two and his long life was crowded with many achievements of the highest order. He was the first Rumford Professor of the Application of Science to the Useful Arts. He assisted in the editing of the first edition of the United States Pharmacopoeia, following this with "Bigelow's Sequel," a commentary on current remedies. During the great cholera epidemic of 1832 the death rate in Boston was the lowest of any of the large cities on the Atlantic seaboard, due to the wise adoption of the rigid sanitary precautions urged by Bigelow. He was a visiting physician at the Massachusetts General Hospital and had a large consulting practice. From 1842 to 1847 he was president of the Massachusetts Medical Society, having served previously as treasurer from 1823 to 1828.

Three other achievements were outstanding. In 1825 the dead of the cities were still being buried in churchyards or in vaults. The matter became a serious one, the churchyards were full and the danger to public health was great. Bigelow wrote a series of papers during the years from 1825 to 1832, urging his plan for a forest garden cemetery outside of the city. A storm of opposition and ridicule met this proposal. Bigelow met this criticism, supplemented his statements and where necessary, defended them. Here as in other battles, he carried his own cause. In spite of continuing dissent, the Mount Auburn Cemetery was dedicated for public use in 1832. In a very true sense Bigelow was the founder of this first modern cemetery. "He laid out the grounds, thinned the trees, surveyed roads, paths and hedges; he supervised the ornamentation. He designed its classic gateway and approach. He became the first of our landscape architects."

Bigelow was also an educational reformer. In 1865 he delivered an address on the "Limits of Education" at the opening of the great hall of the Institute of Technology. His object was to break rather than extend the limits. He believed that education should be extended from ancient and classic lore to the recognition that scientific studies, modern languages and learning also constitute education. He placed the culinary art beside music and painting. He asked, "Why should not a refined and cultivated anesthesia be so varied in its applications and degrees as to exempt mankind from their griefs and grievances by an artistic application?" All this is commonplace today but caused widespread discussion at home and abroad at the time. Just how much we are indebted to Bigelow for our modern college curriculum is very difficult to determine. Doubtless, he was but one of many who argued for this reform.

His most important paper was that entitled "Self Limitation of Diseases." The medical profession needed this confession of past error and the acknowledgment that it might still be wrong and be experimenting in the dark. "Medical books," he says, "are prompt to point out the cure of diseases. Medical journals are filled with the crude productions of aspirants to the cure of diseases. Medical schools find it incumbent on them to teach the cure of diseases. The young student goes forth into the world, believing that if he does not cure disease, it is his own fault. Yet when a score or two of years have passed over his head he will come at length to the conviction that some diseases are controlled by nature alone. He will often pause at the end of a long and anxious attendance and ask himself how far the result of the case is different from what it would have been under less officious treatment than that which he pursued; how many in the accumulated array of remedies which have supplanted each other in the patient's chamber, have actually been instrumental in doing him any good. He will also ask himself whether in the course of his life he has not had occasion to change his opinion, perhaps more than once in the management of the disease in question and whether he does not, even now, feel the want of additional light."

He anticipated and answered the questions, "Is there then no need for a physician?" "Shall he then in any case stand by and do nothing, *prescribe* nothing?" The preventing of the doing of some things, he says emphatically, is often the highest form of service. There is also abundant use for the physician "in the discriminating study of a case, in careful interpretation of na-

ture, in coöperating with it, in soothing and palliating appliances, and in averting incidental aggravations of disease. Besides this, science has really accomplished something." Homeopathy he likened to this side of medical practice which without interfering, awaits expectant on its unassisted course. This is the real reliance of Homeopathy though not its avowed one. Bigelow was tolerant of the doctrines of Hahnemann, "A certain portion of mankind," he says, "are so constituted that they require to be ridden by others and if you should succeed in unhorsing a particular impostor, it is only to prepare the saddle for a fresh and more unflinching equestrian."

So rapidly was the change effected that today there are only traditions of the old methods of heroic treatment and blind submission to dogmatic therapy. One would like to conjecture as to the effect of these opinions upon the mind of Henry J. Bigelow, the son of Jacob and wonder whether they were the force which impelled him to embrace the surgical side of the healing art.

In old age Bigelow amused himself by writing "Chenodia" a Mother Goose rendered in Greek and Latin. With his wife and friends he took a sightseeing trip to California. He had a wholesome interest in political events for he had been the friend of John Adams, Thomas Jefferson, Daniel Webster, Lincoln and Grant. His son became a famous surgeon in Boston. He who had been the Nestor of his day became a distinguished, approachable, old man oracle. He remained modest and unassuming. Blind and bedridden for the last five years of his life he was unforgotten to the very end. He died Jan. 10, 1879.

The poem quoted at the beginning of this biography is the Phi Beta Kappa poem, written by Jacob Bigelow and delivered at Cambridge in 1811. It is truly a self portrait.

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VERMONT STATE MEDICAL SOCIETY

IRRADIATION TREATMENT OF TUMORS*

Late European Developments

BY C. F. BALL, M.D.†

SINCE I grew up with the therapeutic development of x-rays and radium, I naturally had a keen interest in the Fourth International Congress of Radiology, and a special interest since a prominent part of the program of that Congress was to be a résumé of therapeutic technics as used by the important clinics of the world. When I was invited to accompany the American Delegation to Switzerland, I felt particularly honored. I found the Congress to be all that I had expected, and more. One of our American delegates stated that "undoubtedly it was the largest gathering of the leading Radiologists ever assembled in the world".

The American Delegation was royally entertained by the British radiologists for a week in England, at London, Cambridge, and Teddington. The British delegation then joined the American group on the trip to Eindhoven, Holland and up the Rhine through Germany to Zurich. This trip by busses from the Hook of Holland took several days, with stops at most of the important radiological clinics. The German radiologists, like the British, demonstrated their equipment and freely gave detailed data as to their various technics. Therefore my remarks in so far as the Congress is concerned, will reflect not only what was presented in therapeutics at Zurich and St. Moritz, but also what was learned en route. To me, each was of equal value.

Irradiation technics fall into two general groups: Regulative and Destructive. The former are applicable principally to benign processes or lesions encountered in medicine. The destructive technics are more specifically applicable to malignant neoplasms or malignant functional processes encountered in surgery.

Perhaps the most important single statement made relative to the general subject of irradiation therapy was made by Professor Schinz[1], President of the Congress, in his introductory address. When speaking of the relation of surgery and radiology, he said: "It is clear that Surgery and Radiology have their indications, strict indications, and these indications should not be forgotten in favor of a personal preference. *Even more harmful can be a separation of deep X-Ray therapy and Radium therapy.*" Irradiation should never be thought of in terms of either agent alone. X-rays are frequently ineffective of themselves, but when combined with proper radium dosage, the two become admirably efficient. The same is true of the uses of radium, except in unusual amounts.

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Since a common unit of measurement has long been desired, it made the most interesting physical question at the Congress, the discussion of ways and means of computing equivalent units in both the x-ray and radium beams. We visited, en route, several physical laboratories where special apparatus had been developed for this purpose. Several papers at the Congress dealt with the possibility of reasonable accuracy in measuring characteristic rays in "R" units from both sources by a single ionization chamber. Irradiation therapists must think of dosage factors with either agent in "R" units of ionization absorption as applicable to the particular lesion being treated. When using the combined energies, only dosage factors that are known to interlock favorably should be employed. We live in a day of specialization. Irradiation therapy is being divorced from roentgenography. It is frequently claimed each should be a specialty by itself. Perhaps the day is not far distant when irradiation therapy will be further specialized by division into its medical and surgical aspects. For the present, they are considered together. The field of irradiation activities then is about as broad as the combined fields of medicine and surgery. Experimental efforts in this broadening field are ever bringing to light new facts of great importance. Such experimental work may challenge the rationale of previous empirical applications of either agent on the one hand, or on the other lead irradiation into even broader fields of usefulness.

Two morning programs at Zurich fulfilled just these conditions. The paper, "Radiation Genetics" by H. J. Muller[2] of Texas, on the effects of x-ray on the genes of chromosomes, was distinctly cautioning in character; while the paper by W. T. Astbury[3] just as distinctly leads into new fields.

Muller discussed what takes place in the chromosomes when an ovary is x-rayed. (Radiographic dosages not effective unless excessively repeated.) He showed how mutations occur by the "fracturing process" of the x-ray on the chromosomes and how some of the fractured segments get misplaced and when united with other segments or genes, produce mutations. This fracturing process can be produced quite regularly and each fracture can be identified and the amount of the loss of the genes, as the result of the fracture, computed. He further stated, "genes are markable and can be identified as lost or present".

Breaks referred to are something of the order of 1/20 micron. More than just breaks, whole sections can be taken out and located elsewhere in another chromosome. Mutation changes are in direct proportion to the energy expended, whether over a short period of time, or over a lifetime. It is rather independent of the type of the energy applied. Effects are just as definite in each case. These effects are not always gross. They may exhibit themselves functionally, though they always exist, one way or another. All life is subject to certain mutations for one reason or another. If a man was to receive 35 R units throughout his lifetime, his mutation possibilities would be doubled.

Mutations occur as in light spectra. that is there are three main divisions. A visible section in the center, with an invisible infra region to the left and an ultra region to the right. Infra visible mutations are essentially functional mutations. Visible mutations are as the name indicates. Ultra mutations are death producing. Functional mutations are doubtless far more reaching in their genetic upset than they are usually thought to be. Some are even suggesting, on good experimental basis, the probability that such mutations underlie the cancer problem.

From these findings it is essential to use x-rays and radium cautiously and only in lethal doses, when the rays are used in such a way they might affect human genetic cells. Muller's closing sentence was: "Better kill the reproductive process than maim it, with resultant crop of human mutations."

Astbury went into the x-ray study of the polypeptides or reduction products of protein digestion. He measured by shadowgraphs the length of the polypeptide chain keratin-CH-NH-CO-

When keratin is stretched the shadowgraph, or spectrum, is definitely changed. The relation between these changes is definitely computable with great accuracy. Unstretched, keratin is referred to as Alpha keratin, and stretched keratin is known as Beta keratin.

He also measured the difference between the length of the molecule in unstretched and stretched hair, feathers, quill, tendon, etc. X-ray shadowgraphs, or spectra, give a remarkable confirmation of the previous claim of paleontologists, that birds and fish are distinctly related. X-ray shadowgraphs of bird feathers and fish scales are almost exactly alike. Basic protein molecules of the various albuminoses always give the same spectrograph.

In the surgical application of irradiation, perhaps some of the most sensational experimental work has been done on the living cancer cell, by the London and Cambridge workers. Cultural requirements and the biological activity of cancer cells were described by Miss Fell, a biologist at Cambridge, on our trip to Cambridge. She also showed in cinema, cancer cells with slow motile activity, with now and then a cell undergoing division. Dr. Canti, at the reception in London tendered the American delegation by the British radiologists, showed in cinema the effects of rather large doses of radium on active cancer cells which had been grown in vitro by Miss Fell. In

every instance, in about twenty minutes after the application of the radium, the motility of the treated cells ceased abruptly, and did not resume activity upon removal of the radium, and later these cells showed evidences of active degeneration. It was a most conclusive optical demonstration of the effects of irradiation upon living cancer cells in vitro. Such demonstrations leave no question as to the value of irradiation in the field of cancer therapy. Its proper application is the only question to be determined. From past experience, many well-established technics are now available.

REGULATIVE MEDICAL USES

The regulative medical uses of irradiation therapy are more limited than the destructive surgical uses. Regulative medical therapy has been used very successfully for years by some of the best therapists for the control of hyperthyroidism with results comparable to surgery. It is now being used more and more for the control of hyperparathyroidism. Beneficial results have followed its use in diseases of the reticulo-endothelial system, notably the leukemias, Hodgkin's disease, lymphosarcomata, etc. The most frequent use, however, has been the application of one or the other agent to the ovarian area for the purpose of the control of the various forms of ovarian dysfunction. Since the advent of sex hormone therapy, and a better appreciation of the damaging effects of irradiation on genetic cells, this use of irradiation therapy is fast disappearing, as it well should. Fibromyomata should never be irradiated except in doses lethal to the genetic cells. Irradiation results in this disease are remarkable. No uncomplicated "fibroid" need be surgically removed. Irradiation will reduce a "fibroid" regularly, painlessly, and without any mortality.

Experimental work on other hormones, seems to offer further possibilities in the regulative field of medicine.

DESTRUCTIVE SURGICAL USES

There is universal accord in granting that all early skin lesions of a malignant nature are preferably irradiated. Only a small number of late lesions require surgery, and then electrosurgery. Keratoses should be irradiated before they begin to ulcerate, or at least as soon as they undergo ulcerative changes. When treated early, they respond readily without scarring. Only late lesions produce scarring. While epidermoid and basal-celled lesions may require different dosage factors, it is only essential for the physicians not treating these lesions to know that both are amenable to this form of therapy. There is one lesion often confused with epithelioma that should seldom be irradiated, and that is ulcerative tuberculosis of the skin. X-rays or radium will readily cure this lesion immediately, but in many cases it is followed, a few months later, by a definite epithelioma, which is then not readily amenable to treatment.

Early oral malignancies of the mouth and tongue are curable in a large percentage of cases,—about 85 per cent according to Pfahler[4] and others. Only the late lesions with cervicular glandular involvement fail to respond to treatment and even some of these may recover. Active, persistent therapy is needed even in the early cases so frequently taken all too lightly by many physicians. Late cases are difficult problems from any angle. Such cases should not be allowed to occur.

Malignancies of the sinuses and nasopharynx are difficult to treat satisfactorily because of the damage to the surrounding parts from the large doses required. This brings us to one of the most discussed forms of therapy at the Congress, the so-called Coutard technic. Quite a definite accredited therapeutic technic has been worked out by Coutard[5] at the Curie Institute, for malignancies about the oral cavity. It is a drastic procedure, and formerly was used only in the large clinics on account of the intense skin reaction, obtained from the intensive dosages administered. Results, however, warrant its use wherever this form of treatment can be given.

An average of about 32 per cent of clinical cures of three to five years' duration were reported by various authors. These figures are by far the best ever obtained, by any other form of care for this class of nigh hopeless cases.

Metastatic glands of the neck from the lesions about the mouth, tongue, or throat, as well as those from primary lesions of the breast, are all considered essentially nonsurgical, except only as they are approached surgically for the purpose of implanting radium needles, seeds, etc. These glands should be considered under two heads, those apparently radiosensitive and those radioresistant.

The general policy in the care of all such glands is first to irradiate vigorously, continuously, and long, or as long as the glands show proper regression. Many such glands will then subside either completely or temporarily, for varying lengths of time. Many permanent cures have thus been obtained.

In the second group, if irradiation seems ineffective, and the general condition will admit, and the enlarging glands are embarrassing important structures, if surgically possible, these are then removed, preferably by electrocoagulation dissection.

Cancer of esophagus has had a renewed hope offered it, in the opinion of the British therapists. One of the London workers has developed an extended technic, rather drastic in effect, but giving better final results than any other technic yet devised.

W. M. Levitt[6] at St. Bartholomew's Hospital, London, developed a modified Coutard technic:

"(1) To provide an intensity of radiation on the esophagus comparable with that obtained by the technic in use for the treatment of similar growths in the throat.

"(2) To provide a daily dose to the esophageal growth which should equal as nearly as possible that obtained by a similar growth in the throat treated by the usual technique.

"(3) In addition, it was considered important that a sufficient span of esophagus above and below the growth should be included in the irradiation because of the known tendency of the disease to spread up and down the esophagus."

General consensus in Cancer of the Breast is that *all malignancies of the breast should be preoperatively irradiated.* Transirradiation of the breast mass should be employed as much as possible, thus avoiding the thorax to a considerable extent. There are axillary nodes and some supraclavicular nodes that often can be more successfully attacked with radium than with the x-rays. X-rays are more applicable to the larger areas of the chest. In a few weeks after the treatments, operative removal may be used in suitable cases, such cases being those where complete regression of the secondary glands occur. Then a Halstead operation is indicated. Otherwise there seemed to be a general feeling that it is best not to explore an axilla with persistent nodes, following irradiation, since such surgery would definitely aggravate an otherwise partially or completely arrested activity. Breast statistics are at best bad, by any or all methods of therapy. Early diagnosis and early treatment have not seemed to be too effective!

Primary carcinomatosis of the lungs or bronchial primary carcinomata are dealt with rather more conservatively as to individual indications, but such modified treatments are made to extend over longer periods of time.

It is now felt that longer and smaller dosages per treatment, continued over longer periods of time, effect more mitotic cell divisions and so ultimately kill off more cancer cells than the big single dosage therapy of a few years ago. Perhaps more accurately it helps to build up a defense mechanism which of itself limits the diseased process. There are many experimental data to substantiate this latter position but I cannot go into it further at this time.

Adenocarcinomata of the intestinal tract are not successfully treated as a general rule. Now and then there is a favorable case, which goes to indicate that a therapeutic trial should be made. It should be followed up if the tissue is radiosensitive, abandoned if resistant. A few treatments only are needed to determine which is which. Some clinics irradiate through the open wound direct to the tumor mass. In this particular class of cases close association with early surgery is imperative. *Only as abdomens are explored on a reasonable suspicion of probable malignancy can this form of disease be helped.*

Some slight progress seems to have been obtained in the protracted type of irradiation therapy in cancer of the rectum and prostate. Most of these cases are seen too late.

Preoperative irradiation is advisable in all tumors of the kidneys, since irradiation does not seem to damage the renal epithelium of a glomerulus or of the tubules. It does, however, reduce the size of the tumor by its effects upon the embryonal and sarcomatous forms of tissue found in many of the kidney tumors. After their reduction in size and cellular inhibition, they are then more safely removed surgically. The irradiation does not increase the surgical difficulties of the nephrectomy. This applies to the three types, hypernephromata, adenocarcinomata, as well as the mixed tumors of the kidneys. Not all respond favorably since some have a large amount of fully developed radioresistant epithelium. If the tumor does not subside with a good course of irradiation promptly, stop treatment and do a nephrectomy at once. Irradiation will often make an otherwise hazardous operation safe.

Irradiation has raised the curability of cancer of the cervix from less than 15 per cent by the older surgical procedures, with a 50-50 operative mortality, to about 50 per cent curability, and this without any appreciable mortality. Moran[7] in his paper "Some Opinions Based on Cancer Work in Australia", states the following concerning cancer of the cervix: "Two facts stand out. One is that such menopausal bleeding is not often an early sign unless it be the slight 'show' which follows the marital act. Secondly, a lack of faith in the capacity of medical men to effect a cure leads the sufferer to postpone consultation, for she prefers to live in ignorance rather than to be definitely informed that she has what she believes to be an incurable disease. The attitude of many practicing doctors who do not appreciate the notable advance made in the treatment of uterine carcinoma is chiefly responsible for this; their lack of optimism filters through to the lay population." . . . "What parallelism exists between the increased incidence of uterine cancer and the increased use of chemical and mechanical contraceptives, it is difficult to say, but the subject invites careful enquiry." Statistics shown from Stockholm indicated that present technic was about as effective as the clinical appearance of the disease allowed, 70 per cent cures in grade 1 cancer of the cervix, about 50 per cent in grade 2, and only about 20 per cent in grade 3 and practically none in grade 4 cases. No alteration in technics had seemed to improve their figures in the past five years. Grades 1 and 2 are the most hopeful. Physicians

should remember that grade 1 is practically non clinical, found only on routine biopsy, and grade 2 is only suspicious or very early clinically, grade 3 is readily recognized clinically and too late for good results, grade 4 is grossly apparent and almost hopeless.

Up to recently, cancer of the fundus was thought best removed surgically. Several authors at this Congress gave statistics that indicated that irradiation was frequently as effective as surgery, without the usual surgical mortality risk.

Chorionepitheliomata and some of the teratomata are radiosensitive. The required extent of irradiation therapy in these tumors may be determined by the Aschheim-Zondek Test.

Epitheliomata of the penis and vulva come under skin lesions already referred to, but are far more difficult to treat than similar lesions on exposed surfaces because the associated glands have to be treated the same as metastatic cervical glands, with heavily filtered protracted irradiation.

Metastatic bony lesions in some instances respond to irradiation therapy. Primary bone tumors are usually very resistant and a therapeutic test should be made in all cases. The problem of bone tumors is difficult from any angle. Osteoporosis of endocrine origin is benefited by irradiation to bone lesions and endocrine glands involved, usually the parathyroids.

SUMMARY

The international scope of the Congress of Radiology was fully expressed by the large number of different countries represented on the program.

The experimental, physical, and clinical papers were thoroughly international in character, and all in general accord. Particularly was this true relative to the clinical application of irradiation therapy. Many technics were quite thoroughly standardized at least in principle, if not always in exact physical relations. There was a very definite trend in the use of radium, away from interstitial (needling) irradiation, to surface applications, more highly filtered and at greater distance from the surface, and applied for longer periods of time. Continued absorption of irradiation energy from either source by malignant tissue over longer periods of time seems more effective than the shorter and more intensive methods of a few years ago. In general the x-ray beam is being more highly filtered and given at a more moderate milliamperage, over *many more total hours* of application than formerly. Work with the ultra high x-ray voltages is still experimental. Efforts are being made to perfect apparatus that is capable of measuring both of these irradiation beams in a common unit of energy of absorption.

As a result of these changes, better and better statistics of the curability of cancer are being recorded by the various countries, with each in closer accord one with the other.

Modern irradiation methods add a definite hope to many a cancer sufferer. The general practitioner should reflect this hope in his attitude to his patient.

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MISCELLANY

VERMONT DEPARTMENT OF PUBLIC HEALTH

JULY, 1935

During the month of July, the incidence of communicable diseases, as reported to this Department, is as follows: chicken pox 36, diphtheria 1, German measles 236, measles 187, mumps 39, scarlet fever 16, undulant fever 1, typhoid fever 1, whooping cough 125 and tuberculosis 15.

The Laboratory of Hygiene reports a total of 1882 examinations made in July. The results are as follows:

Examinations	for	diphtheria bacilli	72
"	"	Widal reaction of typhoid fever	51
"	"	undulant fever	71
"	"	gonococci in pus	146
"	"	tubercle bacilli	159
"	"	syphilis	513
"	of	water, chemical and bacteriological	269
"	"	water, bacteriological	284
"	"	milk, market	208
"	"	milk, submitted for chemical only	9
"	"	milk, submitted for microscopical only	0
"	"	foods	10
"	"	drugs	0
"	for	courts, autopsies	2
"	"	courts, miscellaneous	23
"	of	animal heads for evidence of rabies	1
"	for	presence of malaria	2
"		miscellaneous	61
Autopsies	to complete death returns		1

Thirty-seven cases of gonorrhea and eleven cases of syphilis were reported to the Division of Communicable Diseases. This Division mailed 688 Wassermann outfits and 342 slides for gonorrhea.

The Sanitary Engineer visited several towns inspecting sewage systems, water supplies and camps. The Sanitary Engineer also made a survey of one of the lakes in the state.

The State Advisory Nurse of the Division of Public Health Nursing has devoted most of her time during the month of July to concluding the work of the VERA, having received word that the work of public health nursing was closed.

RECENT DEATH

BLODGETT — JOHN H. BLODGETT, M.D., of Bellows Falls, Vermont, died suddenly August 2, 1935. He had been in poor health for a long period. He was born in Grafton, December 31, 1867, the son of Henry and Jane (Ayers) Blodgett. His premedical education was acquired in the public schools of Grafton and Chester, and in the Vermont Academy. He matriculated in the University of Vermont and after receiving the degree of Bachelor of Philosophy in 1895 entered the medical school and his M.D. degree was conferred in 1897. His internship of two years was served at the Boston City Hospital. He first settled in Saxtons River in 1899 and in 1908 he moved to Bellows Falls, where he built up a large practice. Dr. Blodgett served as representative and senator from his county, and was chairman of the State Tuberculosis Commission for a time. He formerly served on the State Board of Registration of Nurses. In addition to membership in the Windham County and State Medical Societies, he was a Fellow of the American Medical Association. He served on the Staff of the Rockingham Hospital and was also a trustee and member of the executive board of this institution. Another medical activity was that of attending physician to the Kurn Hattin Homes. He was a Mason, a deacon of the United Church and affiliated with the Delta Mu college fraternity.

Dr. Blodgett is survived by his widow, Mrs. Mary L. (Abercrombie) Blodgett, formerly of Boston.

HOW GRIEVANCES ARE DEALT WITH UNDER THE ENGLISH HEALTH INSURANCE SCHEME

BY G. F. MC CLEARY, M.D.‡

THERE are 16,071,000 men and women in England and Wales insured under the national health insurance scheme, and there are 16,500 insurance doctors. The insured persons, having paid their contributions to the cost of the scheme, are entitled to receive proper medical treatment; the insurance doctors by virtue of their agreements with the local Insurance Committees are under obligation to give it*; and the Insurance Committees and the Ministry of Health are responsible for ensuring that the doctors' obligations are fulfilled. Where medical services are provided on so enormous a scale, it is inevitable that cases will occasionally arise in which an insured patient considers, rightly or wrongly, that he has not received proper treatment from his insurance doctor; and it is necessary that a procedure should be devised by which such grievances shall be dealt with equitably, expeditiously, and economically.

In some European countries the doctors' obligation to give proper and necessary medical services is enforced by the insurance authorities' selecting the insurance doctors and making them responsible to superior officers for the quality of their work. Failure to do good work may result in the termination of the doctor's appointment. Under the English health insurance scheme there is no selection of doctors by the insurance authorities. Any doctor†, however careless, intemperate and incompetent he may be, has the right to join the local panel of insurance doctors, and he has no superior officer to supervise his work. Some safeguard has been provided by giving the persons insured under the scheme the right, which private patients have, to choose, and change, their doctors; a doctor who acquires a reputation for bad work will sooner or later see his list of patients grow smaller and the lists of his competitors larger by the transfer of patients from his list to theirs. But meanwhile some patients may have been seriously damaged; and from the first it was recognized that additional means would have to be provided to secure that insured patients should receive proper treatment. For the great majority of insurance doctors such means are not needed; their professional conscience is sufficiently developed to keep them up to the mark. But among over 16,000 doctors it would be unsafe to assume that all may be relied upon to give unfailing attention; and it was generally agreed that it would be necessary to adopt some method for enabling insured patients to bring forward their grievances for adjudication. At the inception of the scheme there were doctors who considered that grievances should be heard in law courts, but by most this was regarded as undesirable. Legal proceedings are expensive; a doctor who has successfully contested an unfounded complaint may be unable to obtain costs from the complainant; and the publicity of a legal action does no good to a doctor's practice. It was therefore agreed to

*An insurance doctor's obligation in this respect is expressed in his agreement with the Insurance Committee in the following terms: "The treatment which a practitioner is required to give to his patients comprises all proper and necessary medical services other than those involving the application of special skill and experience of a degree or kind which general practitioners as a class cannot reasonably be expected to possess." Treatment in respect of a confinement is, however, expressly excluded.

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†Except a doctor who has been removed from the panel by the Minister of Health. Removal is a rare event.

set up in each area a special committee to deal with grievances.

THE GRIEVANCE COMMITTEE

Each Insurance Committee appoints a Medical Service Sub-Committee specially constituted to hear complaints against insurance doctors. The Sub-Committee consists of an equal number, not less than three or more than five, of local medical practitioners and of representatives of insured persons, with a neutral chairman. The Sub-Committee's function is to investigate the complaint, find the facts and report them to the Insurance Committee, who on the facts so found (which, if no appeal is made, must be accepted as conclusive) decide what action should be taken. Either party may appeal against the decision to the Minister of Health.

The procedure for dealing with grievances will be more readily apprehended if we take an imaginary case and follow it through its various stages. It is similar to cases that have actually occurred.

THE CASE OF JAMES THOMPSON

James Thompson, who is twenty-six years of age, is an insured person and is employed in an iron foundry at a weekly wage of $15. Two years ago he chose Dr. Smith as his insurance doctor and was on his list when the case began. It began when Mr. Thompson awoke about two o'clock one morning with severe abdominal pain, which Mrs. Thompson vainly attempted to relieve with hot applications. Mr. Thompson was reluctant to send for Dr. Smith, who lived about half a mile away, but after enduring the pain for an hour he felt so ill that he asked his brother, a boy of fifteen who lived in the same house, to go to Dr. Smith and ask him to call as soon as possible. The boy arrived at Dr. Smith's house at 3:15 A.M., rang the night bell, and in answer to the doctor's inquiry through the speaking tube said that his brother had been awakened with a "terrible pain in his stomach," and that he felt very ill indeed and wanted the doctor to come round at once. He added that he had brought his brother's medical card with him to show that he was one of the doctor's insured patients. On being asked whether the patient had been sick or had diarrhea he said he did not know, but he was sure that his brother was "terribly ill". The doctor came downstairs, and made up a bottle of medicine, which he gave to the boy, saying that the patient should take a dose at once and another every two hours if still in pain and that he would call after breakfast. Mr. Thompson was greatly disappointed at not seeing the doctor, but he took the medicine, which, since it contained a substantial quantity of opium, relieved the pain considerably. About 11:45 A.M. the doctor called, found that Mr. Thompson was suffering from acute appendicitis and advised immediate removal to the local hospital, where an operation was at once performed by a surgeon on the hospital staff, the case being urgent.

Mr. Thompson made but a slow recovery, which he attributed to the failure of Dr. Smith to visit him when requested and the consequent delay before the operation could be performed. On leaving the hospital he removed his name from Dr. Smith's list to that of another doctor, and lodged a complaint against Dr. Smith with the Insurance Committee. A copy of the complaint was sent to Dr. Smith and the case referred to the Medical Service Sub-Committee.

The Sub-Committee may dispense with a hearing if they deem the complaint frivolous; in this case they decided that a hearing was necessary, and Dr. Smith and Mr. Thompson were asked to attend their next meeting. At this meeting, which like all meetings of the Sub-Committee, was held in private, neither party being allowed to be represented by a lawyer or other paid advocate, Mr. Thompson, who had received a copy of Dr. Smith's answer to his complaint, gave his account of his illness and his brother told what happened when he called on Dr. Smith. The facts so stated were not disputed by Dr. Smith, except that according to his recollection he was called at 4:30 A.M. and not at 3:15 A. M. He said that the messenger's account of the patient's symptoms led him to think that the case was one of ordinary colic; that it was a most inclement night; and that he had a bad cold and was tired out by a hard day's work. When asked why if he felt unable to go out he did not arrange for a deputy to take the call, he said that the idea did not occur to him. He did not think his short delay in visiting the patient had materially affected the progress of the case. He was closely questioned by the doctors on the Sub-Committee, who seemed less impressed than their lay colleagues by the reasons he gave for his failure to visit the patient when requested.

After hearing the evidence the Sub-Committee prepared a report to the Insurance Committee, in which they found the facts as stated above‡, inferred from them that Dr. Smith had failed to render proper service to his patient, and recommended that a sum of twenty pounds ($100) should be withheld from his remuneration. The Insurance Committee adopted the report without discussion and sent a copy to the Minister of Health.

DR. SMITH'S APPEAL

Dr. Smith exercised his right to appeal to the Minister of Health against the decision of the Insurance Committee on the report of their

‡The Sub-Committee's findings of fact must be accepted by the Insurance Committee as conclusive.

Medical Service Sub-Committee. He thought the decision was unwarranted by the facts of the case. In accordance with the regulations governing these cases§, the Minister appointed an appeal tribunal consisting of three members: a medical officer and a legal officer of the Ministry of Health, and a medical practitioner selected from a panel of insurance doctors nominated by the British Medical Association. At the appeal both Dr. Smith and the Insurance Committee were represented by competent lawyers, and the witnesses, who gave evidence on oath, were subjected to searching cross-examination. The case concluded, the tribunal drew up a report to the Minister in which they stated that they saw no reason to dissent from the decision of the Insurance Committee.

The Regulations provide that in any case in which an insurance doctor has been found by the Insurance Committee (or by the appeal tribunal in a case in which an appeal has been made) to have been negligent in his treatment of the patient, the Minister shall, before arriving at a decision on the case, refer it to an Advisory Committee, consisting of the Chief Medical Officer of the Ministry of Health, two other medical officers of the Ministry, and three doctors selected from the panel of insurance doctors nominated by the British Medical Association to which reference has already been made, and shall consider their report on the case. Our imaginary case, which we have now traced to its final stage, would be so referred, and from what has happened in similar cases that have actually occurred it is unlikely that the decision of the Medical Service Sub-Committee would be modified.

THE WITHHOLDING OF REMUNERATION

It will be noted that in this case the Insurance Committee, adopting the report of their Medical Service Sub-Committee, recommended, with the concurrence of the appeal tribunal, that a sum of twenty pounds should be withheld from Dr. Smith's remuneration. In a case in which money is withheld, the Minister deducts the sum from the moneys paid by him to the Insurance Committee for providing medical services, and the Committee deduct that sum from the next payment made to the doctor. During 1933, remuneration was withheld from eight insurance doctors who had been negligent in the treatment of their insured patients.

REMOVAL FROM THE PANEL

The most severe action that can be taken against an insurance doctor under the disciplinary procedure of the health insurance scheme is removal from the Medical List, or "panel" as it is colloquially termed. This action may be taken by the Minister of Health if he is satisfied that the doctor's continuance on the panel would be "prejudicial to the efficiency of the medical service of the insured". A case of removal usually originates in a representation made by an Insurance Committee to the Minister of Health that the continuance of a certain doctor on the panel would be prejudicial to the medical service; and on receiving such a representation the Minister must appoint an Inquiry Committee consisting of a lawyer (barrister or solicitor) in actual practice and two doctors. The Committee hear the allegations made against the doctor and his reply; the witnesses give evidence on oath, and the parties are legally represented. The Committee do not decide the question of removing the doctor from the panel; their business is to report to the Minister, stating the facts that appear to them to be established by the evidence and the inferences of fact which, in their opinion, may properly be drawn from the facts so established. The decision to remove or not to remove a doctor from the panel rests with the Minister, but before deciding he must refer the Inquiry Committee's report to the Advisory Committee mentioned above and must take their recommendations into consideration.

Very few doctors have been removed from the panel. In 1933 there was no case in which the question of removal was raised.

Complaints against insurance pharmacists are dealt with by a similar procedure, the complaints being heard by committees on which pharmacists are represented. There is, however, no advisory committee to deal with cases in which pharmacists are concerned.

It will be noted that in the procedure of the English health insurance scheme for the settlement of grievances the medical profession takes a highly important part. At every stage in the proceedings the medical aspects of the case are adequately brought to the consideration of the authorities responsible for decisions, and the medical members of the various tribunals are nearly all insurance practitioners familiar with the conditions of insurance practice. The procedure was not devised by the Government and imposed on the doctors; it is the result of many conferences between the Government and the accredited representatives of the medical profession. It has been modified from time to time, chiefly by increasing the disciplinary responsibilities of the profession, and after twenty-two years' experience it is generally regarded as an equitable, effective, and satisfactory method of dealing with grievances.

§The Medical Benefit Consolidated Regulations, 1928.

PARALYTIC TREATMENT OTHER THAN RESPIRATORY

The Important Rules in the After-Care of Poliomyelitis

BY ARTHUR T. LEGG, M.D.*

THE after-care of poliomyelitis cases should start as soon as the paralysis or weakness takes place:

(*a*) To prevent deformity (contractures):

1. By posterior wire splints for the legs to hold them in the normal position.
2. By a corset to hold the trunk in normal position.
3. By a platform splint to hold the arm in abduction to prevent any strain on a weakened deltoid.

(*a'*) The elbow may be flexed or extended, depending on the power in the biceps or triceps.

(*a''*) A hand splint to prevent deformity of the hand.

(*b*) To relieve sensitiveness:

1. By hot packs, two or three a day.
2. By complete rest.

No massage or manipulation should be allowed during the sensitive stage.

A complete muscle examination should be made as soon as the sensitiveness is over.

Muscle training should now be started to strengthen the weakened muscles by carrying out their function voluntarily. This should be increased gradually.

Muscle training should be carried out only by a worker with a thorough knowledge of functional anatomy. The muscle training should be preceded by baking and massage to increase the circulation in the part.

Ultraviolet light therapy may perhaps be of value in improving the general condition of the patient, but it should be understood that it does not constitute treatment of the paralysis.

It is better to obtain a voluntary contraction of a weakened muscle than a response to electrical stimulation. A muscle which shows a definite motor response to electrical stimulation can in most cases produce voluntary motion if placed in a suitable position. The dangers of stimulation are not only from overfatigue of the muscle without reëducation of the nerve pathways, but also from the fact that stimulation, strong enough to produce a response from muscles too weak to respond well voluntarily, is likely to spread to other and stronger muscles. In any case, electrical stimulation should never be used as a substitute for muscle training, or by any person who is not familiar with the exact location of the muscles and the degree of paralysis existing in the various groups.

Overfatigue of the weakened muscles should be carefully guarded against.

Patients should never be allowed to stand in a deformed position.

When the patient with weakened legs or trunk is standing, splints should be applied to hold the feet and knees in their normal position and a corset or jacket to hold the trunk in its normal position in order to prevent deformity.

Patients should not be encouraged to walk soon after the onset or to use mechanical exercisers.

Swimming does not take the place of localized muscle training.

Treatment in water has no more specific value than table treatment; but it is a pleasant way of doing exercises. The buoyancy of the water allows weak muscles to perform their function more easily than is possible otherwise.

The respirator has a place in the after-treatment of poliomyelitis with those patients whose muscles of respiration have been weakened. In the early stages it can be used to rest the muscles of respiration, and later it can be used to increase chest expansion.

Frequent muscle examinations should be made of poliomyelitis cases, in order to record the gain or loss of power of the different muscles, and the exercises should be changed accordingly.

While the most rapid regain in muscle power will take place during the first year, muscles will continue to gain power indefinitely if muscle training is continued.

All cases should be followed carefully for years to note any imbalance of muscle power which will produce deformity.

Reprinted from "A Digest Prepared for Use in Connection with the Exhibit on Poliomyelitis, Scientific Exhibit, American Medical Association, New Orleans Session, 1932."

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MEDICAL PROGRESS

PROGRESS IN THE SURGERY OF THE AUTONOMIC NERVOUS SYSTEM IN 1933 AND 1934*

BY JAMES C. WHITE, M.D.†

THIS review of progress in the field of the autonomic nervous system covers the years 1933 and 1934. Neurology is necessarily a complex subject and that part of it which deals with visceral innervation cannot be simplified beyond a certain point. An attempt has been made, however, to describe the work in as simple terms as are consistent with scientific accuracy. All angles of the subject have been considered relevant, provided they have a definite clinical bearing. For this reason the recent contributions of the physiologists are reviewed in some detail, as they have contributed so much to an intelligent understanding of these problems. The most recent fields opened to the neurosurgeon are the carotid sinus syndrome and the control of hypertension. The application of sympathetic neurosurgery to these conditions is therefore summarized at some length, as are its effects on the peripheral circulation and the ever-important rôle of the viscerosensory nerves in intractable pain.

I. PHYSIOLOGY

Chemical Mediation of Autonomic Nerve Impulses

As far back as 1921 Otto Loewi discovered, on stimulating the vagus nerve of a frog, that a chemical substance appeared in the heart's blood which, when perfused through the heart of a second frog, duplicated the cardiac inhibiting effects of vagus stimulation. The full development of this epochal experiment has been worked out in the last two years and has shown that stimulation of smooth muscle is carried out not by direct nervous discharge, but by a chemical mediator secreted at the nerve endings. An excellent review of the growth of this fundamental concept in neurophysiology has been written by Cannon[1], who has himself been one of the leading contributors to the development of this field. From the anatomical point of view, Stöhr states that only one smooth muscle cell in a hundred is supplied with a nerve ending. The knowledge that a chemical mediator is set free in the occasional cells having nerve endings obviates the necessity for an individual neurone to each contractile fibre. These mediators have been named "parasympathin" and "sympathin." Parasympathin has been found to resemble acetylcholine and, as it is rapidly destroyed by blood or tissue esterase, its physiological effects are limited to a localized area. During nerve stimulation this substance has been found in the blood from the heart, the sweat[2] and salivary glands[3], and the gastric veins[4]. Dale has aptly designated these nerve endings as cholinergic, and Feldberg and his co-workers in Dale's laboratory have discovered the surprising fact that parasympathin is secreted not only at the synapse between the sympathetic pre- and post-ganglionic neurones in the paravertebral ganglia[5, 6], but also in the adrenal medullas[7].

The adrenergic substance, "sympathin," which was discovered by Cannon and his coworkers[1], is liberated at all the sympathetic nerve endings on smooth muscle. This hormone, which resembles adrenalin in many ways, has never been isolated. Cannon and Rosenblueth[8] have shown that it exists in two forms: Sympathin E, which is given off by smooth muscle when excited to contract by sympathetic impulses, is carried by the bloodstream and is capable of causing contraction in distant smooth muscle organs. Sympathin I, on the other hand, affects smooth muscle organs which relax. In character with the generalized diffuse discharge of the sympathetic nervous system, and in contrast to parasympathin, sympathin is widely distributed by the blood stream. Like adrenalin, sympathin causes contraction of smooth muscle even after complete denervation. This has been shown by Freeman, Smithwick, and White[9] to be of real clinical importance, since even after sympathectomy, denervated organs such as the arteries are exceedingly susceptible to these chemical mediators (see below).

Autonomic Centres in the Brain

With the advance in our knowledge of neurophysiology the governing centers of the involuntary nervous system have been followed steadily upwards from the medulla oblongata through the diencephalon and have at last reached the cerebral cortex in the premotor region. Much of this work has been carried out in Dr. Fulton's laboratory at Yale, where an intensive investigation has been made on this portion of the brain. He and his colleagues have shown that stimulation of the premotor area in monkeys and chimpanzees gives rise to vigorous peristaltic movements of the gut and that bilateral extirpation causes morbid hunger and even at times obstructive intussusceptions[10, 11, 12]. Considerable disagreement still exists concerning the control of body temperature by the cerebral cortex. Kennard[13] claims that ablation of the premotor area in the monkey causes a failure of reflex vasodilation on the opposite side of the body, whereas Pinkston, Bard and Rioch[14] have observed chronic vasodilation after removal of the neopallium. After removing a cor-

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responding area in a case of brain tumor, Zollinger and Schnitker[15] were unable to detect any change in skin temperature of the extremities.

Investigation of the autonomic centres in the hypothalamus has been carried on by Ranson, Kabat, and Magoun[16]. They have contributed additional evidence that the area behind the optic chiasm contains important sympathetic centres, and that stimulation of the preoptic region causes a slowing of the heart and a fall in blood pressure, as well as contraction of the bladder (i.e., a parasympathetic discharge). Davis[17] has emphasized the importance of that portion of the hypothalamus above the stalk of the pituitary (the tuber cinereum) in the control of carbohydrate metabolism.

The Cerebral Circulation

The problem of the vasomotor control of the circulation through the brain has been extensively investigated by Cobb and his co-workers during the past six years. Accurate measurement of the calibre of the pial vessels has been made possible by Forbes's brain window technique. A summary of this work has been published by Cobb[18]. Anatomists have long taught that the cerebral arteries do not anastomose, i.e., that they are all "end arteries". It has also been held that these arteries have no vasomotor mechanism. Recent investigations in the department of neuropathology at the Harvard Medical School have shown that both of these concepts must be revised. The pial, as well as the dural arteries show well-marked constriction when the cervical sympathetic chain is stimulated or on direct application of adrenalin. The vasodilator pathway of the cerebral vessels has been found to leave the brain stem in the facial nerve, to traverse the geniculate ganglion, and thence to follow the cerebral vessels. Drugs such as alcohol, histamine, amyl nitrite and acetylcholine increase cerebral circulation, but the most effective stimulant is the inhalation of a mixture of 10 per cent carbon dioxide in 90 per cent oxygen. Clinically it is now realized that vascular spasm plays an extremely important rôle in syncope, migraine, and epileptic convulsions.

The Vasodilator Nerves

Rosenblueth and Cannon[19] have pointed out that active vasodilator reflexes persist in totally sympathectomized animals. These investigators suggest that the vasodilator system is probably constituted and distributed as follows: A, autonomic dilators, (1) sympathetic, distributed primarily to skeletal muscle, (2) parasympathetic, distributed to special localized regions (e.g., chorda tympani, nervi erigentes); B, dorsal root dilators, distributed primarily to skin and viscera, as described long ago by Bayliss. Bishop, Heinbecker, and O'Leary[20] have investigated this last group with the cathode ray oscillograph and by means of differential blocking of the sensory and motor fibres with narcotic drugs and by pressure. They conclude that there is a special type of non-myelinated neurone in the dorsal roots and in purely sensory nerves, such as the saphenous, with cells of origin in the dorsal root ganglia. These resemble autonomic neurones and are the only fibres in the sensory root which on stimulation produce a vasodilator response. This work eliminates the somewhat clumsy explanation of "antidromic conduction" of vascular impulses by the posterior roots.

Carotid Sinus Mechanism

C. Heymans and his collaborators[21] in Ghent have made an exhaustive study of the hitherto unappreciated rôle of the carotid sinus in the regulation of blood pressure and of a large number of important visceral mechanisms. They have shown that there is a special sensory innervation situated at the bifurcation of the common carotid arteries. Impulses set up in a group of sensory end organs in the arterial wall are conducted to the brain stem by the glossopharyngeal and vagus nerves, thence they are distributed over the entire autonomic system. By this reflex mechanism a local rise or fall of blood pressure in the carotid sinus gives rise to a generalized vasodilator or vasoconstrictor response. Resection of the carotid sinus nerves in the dog results in a persistent tachycardia and a hypertension of 200 to 300 mm. After total sympathectomy this is abolished[22]. Certain carotid sinus reflexes, however, are only abolished by cutting the spinal cord in the upper thoracic region. The sinus is also sensitive to changes in carbon dioxide and oxygen tension, to variations in hydrogen ion concentration, and to numerous drugs.

The Reaction of the Sympathetic Nervous System in Shock

In relation to the homeostatic activity of the sympathetic nervous system it has long been appreciated that after severe accidents and operations, as well as in acute illness, this division of the nervous system does its utmost to preserve the constancy of the "milieu intérieur." Freeman[23], however, has shown that after prolonged hyperactivity even this most foolproof of automatic regulating devices may go wrong and lead to the destruction of the organism which it is commonly supposed to preserve. Thus in severe traumatic shock or dehydration[24], medulliadrenal activity causes such an intense degree of vasoconstriction that the tissues may become asphyxiated and the vital blood volume reduced to a fatal level by leakage of the plasma through the anoxemic capillary walls. The stranded red blood corpuscles increase viscosity and the effective blood volume is further reduced by peripheral stagnation.

II. OPERATIVE METHODS

Recent Modifications in the Technique of Cervicothoracic Ganglionectomy

The posterior longitudinal incision devised by Adson for reaching the inferior cervical and first two thoracic ganglia by resecting the central ends of the first or second ribs often results in separation or delayed healing of the wound. This is due to the necessity for continuous and forceful retraction of the tissues and also to the difficulty in suturing the incision at the edge of the spinous processes. Adson[25] has recognized the shortcomings of this incision and has modified it to the extent of cutting off the tips of the spinous processes. When this is done the fascia and muscle can be sutured as in a laminectomy incision. In every other respect the exposure of the ribs is unchanged.

White, Smithwick, Allen and Mixter[26] have advocated an oblique muscle splitting incision. This is carried from the prominent spine of the seventh cervical vertebra to the angle of the scapula. The trapezius muscle is split in the plane of its fibres and the space between the superior rhomboid and the levator anguli scapulae entered. On separating the thin fibres of the serratus posterior superior muscle, the first and second ribs are found to lie directly in the long axis of the incision. By this route less bleeding is encountered, a minimum of retraction is necessary, and an excellent exposure is obtained. This incision is particularly applicable to a unilateral approach; if a bilateral ganglionectomy is indicated, these writers feel that it is best carried out in two stages a week to ten days apart.

Gask and Ross[27], who prefer the anterior cervical approach, have found that it is possible to resect the chain to the second thoracic ganglion, provided the scalenus anticus muscle is transected. With this valuable modification, the resection of an adequate number of ganglia is no longer a difficult procedure.

Reichert[28] has advocated the injection of alcohol instead of the resection of the lumbar ganglia in certain cases of intermittent claudication or threatened gangrene. He feels that it is less dangerous than operation for the elderly arteriosclerotic, and that it is better for economic reasons in many cases with thromboangiitis obliterans. He reports that twenty-four out of twenty-nine of the arteriosclerotics were improved, some markedly. There was an increase in walking ability from double the former distance up to two miles. The results in the cases with Buerger's disease are less impressive.

Craig[29] has developed a practical posterior infradiaphragmatic approach to the splanchnic nerves. Although this has given disappointing results in hypertension, it should be of definite value in the control of pain from the upper abdominal viscera.

III. EFFECTS OF SYMPATHECTOMY ON THE CIRCULATION

Coller and Maddock[30, 31] have brought out the importance of the regulation of blood flow through the skin of the arms and legs in the control of body temperature. In the first place these areas, which on account of their irregular shape make up an extraordinarily large proportion of the total surface (i.e., 65 per cent), have a much greater function in the dissipation of body heat than does the skin of the head and trunk. Interrupting the normal heat regulating process by sympathetic ganglionectomy results in a considerable increase in blood flow to the extremities.

In a recent and most interesting review of their ideas on Raynaud's disease, Lewis and Pickering[32] point out that this eponym should be abandoned, as it has come to include a number of entirely unrelated conditions. Such a grouping cannot fail to obstruct inquiry into the causation of the various maladies which are included under it. They have subdivided these into a practical and more exact classification:

"1. Intermittent spasm of digital arteries, without complications.
"2. Intermittent spasm of digital arteries with local nutritional changes.
"3. Intermittent spasm of digital arteries with generalized scleroderma.
"4. Raynaud's phenomenon arising out of local injury, including the use of vibrating tools.
"5. Bilateral gangrene of digits in the young, and with infection; this condition is regarded as probably the result of thrombotic closure of vessels.
"6. Bilateral gangrene with haemoglobinuria from cold, a condition having probably a unique pathogeny.
"7. Bilateral gangrene of digits in the elderly, in which closure is shown to be thrombotic, but preceded by disease of the small arteries.
"8. Thromboangiitis obliterans associated with Raynaud's phenomenon.
"9. Cervical rib or crutch pressure causing Raynaud's phenomenon or gangrene, so it is thought, by thrombotic and embolic processes."

Lewis and Pickering insist that gangrene cannot take place from uncomplicated vasospasm, and that in all these conditions except the first there is definite pathology in the arteries.

Surgeons who treat this group of diseases are at present considerably less enthusiastic about the results of sympathetic ganglionectomy in restoring a satisfactory circulation to the arm than to the leg. Thus Sheehan[33] states that "cervicodorsal ganglionectomy for Raynaud's disease, although resulting in a definite improvement in the condition of the upper limb, rarely gives a complete recovery. This incomplete result, in

marked contrast to that of the lower extremity, has been noted by many surgeons." To account for this discrepancy, it should be pointed out that the leg cases usually fall in Lewis's first group. The toes very rarely go on to spontaneous gangrene and therefore the condition is more probably one of pure vasospasm. In addition, it is a simpler technical procedure to ensure cutting all the vasoconstrictor fibres to the lower extremity. However, even in the early uncomplicated forms of the disease and after complete sympathetic paralysis of the upper extremities, recurrent vasospasm is not a rare occurrence. Fitting in with an observation which has been reviewed above that denervated smooth muscle remains sensitive to adrenalin, Smithwick, Freeman and White[34] have found that the completely denervated arm becomes intensely sensitive to the circulating hormone of the adrenal medulla. This sensitivity is much more marked in the arm than in the leg and probably is the cause of the fundamental difference between the results of the two operations. It is a most striking phenomenon in the rabbit's ear, but disappears and permits constant vasodilation if the adrenal glands are inactivated[9].

In searching for the etiology of vasospastic disease, Craig and Kernohan[35] have examined the ganglia from 208 cases. In comparing their histological observations on sympathetic ganglia removed at operation with those from postmortem subjects without arterial disease, nothing was found to explain the various vascular disturbances. All the changes which have been commented on by other writers were found to be within normal limits and most of them explained on the basis of advancing age.

During the past two years ganglionectomy has been enthusiastically advocated for the treatment of the cold, cyanotic legs after poliomyelitis (Telford and Stopford[36]), for the vasospastic group of patients with thromboangiitis obliterans (Adson[37]; Diez[38]), and for extreme degrees of hyperhydrosis (Leriche and Arnulf[39]).

One of the latest developments in the field of sympathetic neurosurgery is the treatment of hypertension. Exclusive of the periodic crises of hypertension caused by chromaffin cell tumors arising from the adrenal medulla, the only type which has responded to operations on the sympathetic nervous system is the essential form which occurs among comparatively young individuals, is progressive in spite of medical treatment, and carries a uniformly unfavorable prognosis. This has been designated as the malignant type. According to Hines and Brown[40], patients with this variety of the disease show an unusual rise in blood pressure on exposure to cold.

A number of operations have been recommended to reduce hypertension, either by eliminating vasoconstrictor tone from large areas of the body or by reducing adrenal secretion. With the latter end in view, De Courcy[41] has recommended subtotal bilateral adrenalectomy. Although he has reported apparently good results in a series of eight cases, the observations date over too short a period to be at all convincing. The risks of the procedure and its lack of sound physiological background make it necessary to postpone final judgment as to its value. In the attempt to reduce vasoconstrictor tone, the first operative procedures consisted in sympathetic denervation of the upper and lower extremities. This did not affect a sufficient portion of the arteriolar bed to modify the systemic blood pressure. Craig and Brown[42] later advocated resection of the splanchnic nerves as they enter the abdominal cavity between the crura of the diaphragm, but the results were still unsatisfactory in the more advanced cases. The most logical procedure, but at the same time the most radical, is the section of the lower six thoracic and upper two lumbar anterior spinal roots as proposed by Adson and Brown[43]. This operation not only eliminates all vasoconstrictor impulses to the lower half of the body, but denervates the adrenal glands and reduces intra-äbdominal pressure as well. While its early results as reported from the Mayo Clinic and also by Page and Heuer[44] are distinctly encouraging, this radical type of operation should still be regarded as in the experimental stage; only time and a large number of cases can tell whether this new form of neurosurgery can achieve another victory over a disease which has heretofore resisted all other forms of treatment.

While underactivity of the carotid sinus causes hypertension in the dog, failure of this control mechanism does not seem to be a cause of this condition in man. Weiss and Baker[45] have described the interesting syndrome which is due to an hyperactive sinus. Studies have been conducted on fifteen such cases. The patients complained of dizziness and fainting attacks occurring whenever the region of the carotid bifurcation was pressed upon. In four cases, these symptoms were induced merely by a sharp turning of the head; in the others they could be elicited by digital pressure. Evidence is presented that these symptoms and signs are due to stimulation of the sinus and the intercarotid nerves, not to direct vagal irritation. Three main types of cardiovascular response were observed: (a) marked asystole or slowing of the heart rate; (b) marked fall in blood pressure; (c) changes in cerebral circulation without essential slowing of the heart or fall in blood pressure. The first response is evidently due to a vagal reflex and is abolished by atropine. If the intercarotid nerves are infiltrated with novocaine, all the reflex phenomena are obliterated. In one case reported in this paper, and in a considerable number since, section of the carotid sinus nerves has successfully relieved the symptoms.

IV. VISCERAL PAIN

The neurophysiology of visceral pain has been greatly clarified by Heinbecker, Bishop and O'Leary's[46] demonstration that the sympathetic trunks are traversed by myelinated neurons whose histological appearance and electrical conduction properties are exactly similar to those of the peripheral sensory nerves. These neurones run through the paravertebral chain of ganglia to the posterior spinal roots, where their nerve cells are situated. The viscerosensory fibres should therefore not be considered as a part of the sympathetic nervous system, but as belonging to the somatic cerebrospinal nerves. B. Cannon[47] has implanted shielded electrodes on the larger autonomic nerves of the cat and studied these animals after complete recovery. He has found the cervical and lower lumbar sympathetic chains, as well as the vagus below its recurrent laryngeal branch, to be devoid of pain sensation. On the other hand, the upper lumbar chains and the splanchnic nerves have a high degree of sensory acuity.

The Moores[48] have made a careful analysis of arterial pain. They have concluded that there is a large group of afferent neurones subserving painful sensation which end in close association with the smaller arterial branchings. These can be stimulated under experimental conditions by the intraärterial injection of irritants, such as sodium iodide and lactic acid. Under natural conditions it is probable that they function by virtue of sensitiveness to a chemical stimulus. The most common cause of arterial pain is ischemia, and under these circumstances lactic acid is probably the actual stimulating agent. Moore and Singleton[49] have shown that in the case of the viscera, arterial pain is definitely conducted along sensory neurones in the splanchnic and other sympathetic trunks. Further evidence that afferent fibres run in these channels has been added by Sheehan[50], who has shown by experimental work that the myelinated neurones of the Pacinian bodies in the mesentery travel along the splanchnic nerves. In the extremities, however, arterial pain is not affected by sympathectomy, but is abolished by section of the peripheral nerves.

Migraine

Sympathectomy appears to be of definite, if inconstant, value in the relief of migraine. Adson[51] reports the cure of a case after superior cervical ganglionectomy, ligation and section of the external carotid artery, and interruption of the sympathetic connections of the internal carotid by stripping the common carotid artery. Penfield[52] states that superior cervical sympathectomy and stripping the carotid artery gave only partial benefit in two cases of severe longstanding migraine. He then cut the ophthalmic fibres of the Gasserian root and obtained lasting complete relief. He believes that "unilateral migraine can be cured by radical neurectomy."

Atypical Neuralgias of the Head

This peculiar type of facial pain is only partly relieved by root section of the Gasserian ganglion. Reichert[53] reports five such cases, three of which were relieved of their residual neuralgia by alcohol injection of the upper thoracic sympathetic chain. But sympathectomy cannot be counted on to relieve these conditions, as is shown by the fact that one of Reichert's two failures has been only partially benefited by an additional superior cervical ganglionectomy plus the stripping of her carotid sheath.

Amputation Stump Neuralgias

Hamant and Bodart[54] and also Reschke[55] report four cases of severe amputation stump neuralgias. In these cases vasoconstriction was a common manifestation. Previous resections of neuromata and in one case periarterial sympathectomy had failed. These patients were relieved by resection of the regional ganglia or their rami, and have been free of pain from six months to three years.

Angina Pectoris

White, Garrey, and Atkins[56] have been able to determine the exact pathways of cardiac pain by producing it experimentally in dogs. Sutton and Lueth's method of temporarily constricting the descending branch of the left coronary artery was used. The pain was entirely interrupted by bilateral resection of the upper four thoracic sympathetic ganglia or the upper five pairs of posterior thoracic spinal roots. Resection of the lower cervical sympathetic trunks and stellate ganglia, as in the old Jonnesco operation, section of the intercostal nerves distal to the sympathetic rami, or bilateral vagectomy failed to abolish the pain. These experiments explain the frequent failures of the various modifications of cervical sympathectomy which have been recommended for the relief of angina pectoris. No cervical operation can produce a complete sensory denervation of the heart, because it leaves intact important direct connections between that organ and the upper thoracic ganglia. These thoracic ganglia should be attacked, because after their destruction the cervical sympathetic pathways are interrupted as well, since all the cardiac nerves enter the spinal cord over the upper thoracic white rami communicantes.* White[58] has shown that these experimental findings are well corroborated by clinical results: in four patients in whom the upper thoracic ganglia were resected, cardiac pain on the homolateral side has been abolished. This is equally true after section of the upper five posterior thoracic roots (5 cases on record) and following successful alcohol in-

*Heinbecker[57] believes that there are also direct anatomical connections between the heart and the central nervous system over the cervical segments, as well as over the fifth and tenth cranial nerves. That these pathways are of any clinical significance seems doubtful, as we have had numerous experiences with cardio-aortic pain referred to the head and neck, all of which have been successfully relieved by thoracic paravertebral injection.

jection of the corresponding sympathetic rami and ganglia. The latter is undoubtedly the safest surgical procedure, but occasional failures (20 per cent) are due to its technical difficulty. Both White and Levy[59] report complete relief from anginal attacks on the injected side in 50 per cent of cases and a very satisfactory amelioration in another 30 per cent (54 cases).

Abdominal Pain

Alvarez[60] has written an excellent discussion of this subject both from the clinical and the physiological viewpoints. In this he points out that the main sensory pathways from the upper abdominal viscera lie along the splanchnic nerves, although the sensory neurones do not, strictly speaking, belong to the sympathetic system and are no different from those in the rest of the body. In distinction from the abdominal organs, the root of the mesentery, like the rest of the parietal peritoneum, is supplied by branches of the spinal nerves. Pain from traction on the mesenteries or inflammation of the parietal peritoneum is therefore transmitted over the intercostal and lumbar nerves. Alvarez admits that there is no good explanation for the pain of peptic ulcer. Gall bladder and common duct pain has been stimulated by Zollinger[61] during the course of operation by distention of these structures with a balloon. This gave rise to deep epigastric discomfort, more severe than, but similar to, the attacks of indigestion in gall bladder disease. This was not relieved by infiltrating the anterior abdominal wall with novocaine. It was found impossible to produce referred pain in the back, and localized right upper quadrant pain was noted only when the gall bladder pressed on the parietal peritoneum. Scrimger[62], who previously reported cases of obscure abdominal pain relieved by resection of the segmental sympathetic rami and ganglia, has contributed two additional cases.

Pain from the Pelvic Viscera

The pathway of uterine pain has been shown to enter the spinal cord over its eleventh and twelfth thoracic segments (Cleland[63]). Surgically it is most accessible in the presacral region at the bifurcation of the aorta. Dobrzaniecki and Serafin[64] have published superb illustrations of dissections of this region. Adson and Masson[65] have given a very clear description of the technique for resecting the superior hypogastric plexus. Statistical evidence presented by the latter, as well as by Herrmann[66] and Wetherell[67], proves the effectiveness of this safe and non-mutilating operation in the control of functional dysmenorrhea, as well as in the type of pelvic pain which is often associated with sclerocystic degeneration of the ovaries or occasionally follows operations for chronic pelvic inflammation. Greenhill and Schmitz[68] have also emphasized the effectiveness of presacral neurectomy in controlling the intractable pain of carcinoma of the uterus and cervix. This operation permits the surgeon to inspect the carcinomatous involvement and is so much safer than chordotomy that it should always be tried first*, provided the malignant infiltration has not invaded the lumbosacral plexus. These surgeons have reported a remarkable series of thirteen cases, all of which experienced instant and complete relief of their suffering.

Unfortunately bladder pain is not so effectively relieved by resection of the superior hypogastric plexus. The reason for this is that part of its afferent connections run over the pelvic parasympathetic rami to the second, third, and fourth sacral segments. Certain types of intractable cystalgia can, however, be relieved by presacral neurectomy. Douglass[69] reports that in chronic interstitial and tuberculous cystitis he has been able to secure a worthwhile improvement by this operation. He believes that in the first condition cases which manifest excessive spasm of the bladder neck will respond most favorably. Learmonth and Braasch[70, 71] have advocated a similar procedure, but to date the reported results of this operation have not been very impressive.

V. VISCERAL MOTOR FUNCTION

Cardiospasm

By cutting the thoracic vagi in cats, Knight[72] has been able to produce experimental achalasia of the cardiac sphincter with dilation of the esophagus. Removal of the sympathetic fibres along the course of the celiac axis and the left gastric artery prevents the development of this condition. Clinical corroboration of this experimental observation has been put forward by Craig, Moersch, and Vinson[73], who report the cure of a case of cardiospasm associated with precordial pain radiating to the neck and arm. Paravertebral novocain injection of the upper thoracic ganglia on the left side temporarily relieved the patient's pain and enabled her to swallow without difficulty. Bilateral cervicothoracic ganglionectomy has given her permanent relief.

Megacolon

The anatomy of the nerve supply of the colon and rectum has been carefully studied by Telford and Stopford[74]. Their findings emphasize the fact that the sympathetic fibres which inhibit bowel tone and constrict the internal anal sphincter, can be interrupted either by resection of the lumbar ganglia, by section of their rami, or by dissecting out the plexuses around the inferior mesenteric artery and in the presacral region. This last operation is followed by loss of ejaculation and the failure of spermatozoa to pass down the tubules in the epididymis (Simeone[75]) and is therefore contraindicated in

*Subarachnoid injections of alcohol, as advocated by Dogliotti, constitute an alternative method which is rapidly establishing its efficacy and safety.

male patients. Very favorable reports of the clinical application of these procedures, which were originally advocated by Wade and Royle and by Rankin and Learmonth, have been reported at a joint meeting of the New York Surgical Society and the Philadelphia Academy of Surgery[76].

Paralysis of the Bladder

In an attempt to localize the bladder pathways in the spinal cord, Barrington[77] has found that bladder function is uniformly crippled by lesions in the dorsal half of the lateral columns of the spinal cord. Animal experimentation on the physiology of micturition by Langworthy, Reeves, and Tauber[78] has shown that the sympathetic nerves are in no way essential to normal urination, but actually inhibit this act. Furthermore, their resection improves the function of the automatic bladder. Essentially this parallels the observations made by Learmonth on the human being. The results of the clinical application of this knowledge have been summed up by Learmonth and Braasch[70]. In four cases of "cord bladder", resection of the superior hypogastric plexus brought about marked improvement in two, reduction in residual urine but a continuance of infection in the third, and failure in the fourth case. Another case of neuromuscular imbalance, causing achalasia of the sphincter mechanism, was completely relieved. Other cases are reported, but in these sympathectomy is combined with sphincterotomy or exploration of the cauda equina. The authors are satisfied of the occasional value of this operation in their practice. As time passes, no doubt indications will be more strictly defined. This may mean either restriction of its field or its expansion to include other conditions.

VI. TUMORS

An unusually thorough analysis of the tumors which develop from the cells that wander out from the neural crest during embryonic life has been made by Lewis and Geschickter[79]. This is based on 103 case records of these tumors in the Johns Hopkins Hospital. The undifferentiated cell may give rise to a neuroblastoma and, as differentiation proceeds, the more adult types of paraganglioma and ganglioneuroma may develop. The occurrence of all these types of tissue in the same tumor indicates a common origin.

The neuroblastomas occur mainly in infants and children and have the same embryologic origin as the medulla of the suprarenal gland. They are highly malignant and metastasize to the lymph nodes, liver, lung, and bones. The most common symptoms are fever, abdominal mass, and anemia.

The paragangliomas are the most common tumors of the sympathetic system and are encountered in the medulla of the suprarenal gland, the carotid body, the submucosa of the appendix and small intestine, and the ganglia along the sympathetic chains. They commonly occur in adults and are usually solitary and benign, but may be multiple and at times malignant. Hypertension, urinary symptoms, and gastrointestinal disturbances are the most common symptoms.

Ganglioneuromas usually occur in young adults and are, as a rule, benign and solitary. They may occur anywhere in the central or peripheral, as well as in the sympathetic, nervous system. In the latter system they are most commonly seen along the paravertebral chain of ganglia. Those in the cervical region and thorax may interfere with respiration; those in the abdomen cause digestive symptoms.

In contrast to the cortical tumors of the adrenal which give rise to the suprarenal genital syndrome, the sympathetic syndrome is caused by neoplasms (paragangliomas) of the chromaffin cells. These have been reviewed by Coller, Field, and Durant[80] and by Belt and Powell[81]. The symptomatology of these tumors is quite characteristic and consists of periodic outbursts of sympathoadrenal activity, caused by an increased medulliadrenal secretion. The typical clinical features are paroxysmal hypertension, glycosuria, tachycardia, and vasoconstriction. These are followed by flushing, nausea, vertigo, dyspnea, and susceptibility to shock or pulmonary edema. When surgical removal has been successful, the patients have remained completely relieved.

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CASE RECORDS
of the
MASSACHUSETTS GENERAL HOSPITAL

ANTE MORTEM AND POST MORTEM RECORDS AS USED IN WEEKLY CLINICAL-PATHOLOGIC EXERCISES

FOUNDED BY RICHARD C. CABOT, M.D.

TRACY B. MALLORY, M.D., *Editor*

CASE 21351

PRESENTATION OF CASE

A forty-two year old Armenian salesman entered complaining of precordial pain.

Five years before entry the patient developed severe occipital headache which remained almost constant for two years, increasing in severity during the day and often keeping him awake at night. Two years before entry he was seen in the Out-Patient Department where he was told that he had hypertension and advised to reduce his weight. His blood pressure at that time was 208/160. He had slight pitting edema of the ankles and hemorrhages were seen in the right retinal vessels. The urine had a specific gravity of 1.017. His headaches improved a great deal when he was on a restricted food intake. The latter, however, caused insomnia and he resumed his former voracious eating habits with the result that the headaches recurred and increased in severity. Three and a half years before admission he developed nocturia, at first two or three times a night but gradually increasing until at the time of admission he urinated every half hour during the night and every two hours during the day. There were no other urinary symptoms. Three weeks before entry he developed an upper respiratory infection associated with backache, coryza and cough. Two days later his headaches became very severe and that evening he was seized with a dull precordial pain which had persisted and was worse when he was reclining. On the evening before admission the pain was most severe. During the past three weeks he had developed marked shortness of breath, especially upon exertion. There was no edema.

His family and marital histories are non-contributory.

He had frequent colds and sore throats but there was no history of rheumatic fever or nephritis.

Physical examination showed an obese man, acutely ill and complaining of extreme headache. His breath was uremic. His respirations were labored. His pupils were regular and reacted to light and accommodation. The fundi were slightly hyperemic and showed small hemorrhages. His chest was clear. His heart was slightly enlarged to the left, the left border of dullness being 10 centimeters from the midsternal line, the right 2 centimeters. No murmurs were heard. The blood pressure was 220/140. There was left costovertebral tenderness. The abdomen was obese. The liver edge was felt two fingerbreadths below the costal margin. There was no edema.

The temperature was 99.9°, the pulse 105. The respirations were 30.

Examination of the urine showed a specific gravity of 1.008 to 1.012, a large trace of albumin and a sediment which contained only an occasional red blood cell and granular cast. The blood showed a red cell count of 3,750,000, with a hemoglobin of 70 per cent. The white cell count was 10,800, 83 per cent polymorphonuclears. The stools were negative. A Hinton test was negative. The nonprotein nitrogen of the blood was 82 milligrams. A phenolsulphonephthalein test gave only 5 per cent excretion at the end of one hour. A urine concentration test showed a constant specific gravity of 1.010. The serum calcium of the blood was 8.56 milligrams and the phosphorus 6.12. A lumbar puncture gave an initial pressure of 400 which rose to 450 after combined jugular compression and which fell to 150 after removing 20 cubic centimeters. Otherwise it was not remarkable.

He was put on digitalis on the third day. He rapidly failed, became comatose, developed muscular twitchings and died on the tenth day.

DIFFERENTIAL DIAGNOSIS

DR. WALTER BAUER: It is perfectly obvious after reading the history that we are dealing with a man who had had hypertension for at least two years. We also appreciate that he had impairment of renal function. Knowing that this man was forty-two years of age and that one of his last complaints was precordial pain, one might guess that he died from chronic glomerulonephritis with an associated terminal pericarditis. It is always worthwhile to discuss this type of case because it gives us an opportunity to determine whether we can or cannot distinguish nephrosclerosis from chronic glomerulonephritis. For a long time I had thought that it was always an easy task. However, if one regularly inquires of Dr. Mallory as to his final interpretation in each individual case, one wonders if it is as easy as it would appear. When clinical deductions are based on percentage figures obtained from the analysis of a large group of cases, the differential diagnosis does not seem difficult, but in dealing with one lone case percentage figures of this sort are often of little value in arriving at the correct diagnosis. In fact, such figures may mislead one.

In going over this history I am not certain that I can make a correct diagnosis. This man first came under observation two years ago complaining of headache. At that time he was obese and had hypertension. His urine had a specific gravity of 1.017. We cannot attach too much significance to this one urine examination. When first examined, he did have retinal hemorrhages; in other words, albuminuric retinitis. If we interpret these findings as indicative of an existing nephrosclerosis, even though he had been diagnosed previously as having a benign hypertension, it is apparent that at the time of his first Out-Patient Department visit it was no longer of the benign type because an albuminuric retinitis, high diastolic pressure, etc., characterize the malignant type of hypertension. From these findings one would ordinarily say he had only a few months to live, that the prognosis was serious, and the outlook hopeless.

The average length of life is eighteen months. It is interesting that he should have complained of severe occipital headache for almost two years. If he really had severe headaches of two years' duration, one wonders whether he did not have hypertension prior to the time of the first entry to the Out-Patient Department. If not, one might suspect that it was functional in origin. We have all seen people with hypertension of years' duration who have never complained of headache. In this particular case the headache disappeared when he went on a weight reduction diet. We do not know whether the pressure was affected. I should doubt seriously if the hypertension was influenced by dietary measures.

"Three and a half years before admission he developed nocturia. . . ." That again antedates our first knowledge of the hypertension by eighteen months. Therefore, if the nocturia is related to his final illness, it must be interpreted as meaning some impairment of kidney function eighteen months prior to the discovery of the existence of the hypertension. This symptom of nocturia became so marked that prior to the hospital entry he had nocturia every half hour during the night and every two hours during the day. This I should say was unusually frequent. Therefore, one wonders whether the recent upper respiratory infection was responsible for an associated pyelitis. This seems unlikely because he never complained of fever and had no urinary findings to substantiate such a suspicion. The recent upper respiratory infection might have caused further damage to already damaged kidneys. Nocturia of this grade explained solely on renal impairment is unusual, but I suppose it can occur.

Two days before entry the headaches became very severe and he developed a dull precordial pain. There is very little more said about this pain except that it was always more marked when he was reclining. It evidently was not sufficiently severe to require opiates. If one were to interpret the findings as those of chronic glomerulonephritis, one might suspect that the patient had a terminal pericarditis such as we not infrequently encounter in terminal Bright's disease. From what information we have at hand I do not believe that it represented coronary heart pain.

It does state in the past history that he had frequent colds and sore throats. These infections could represent the cause of chronic glomerulonephritis, if that is what he had.

Physical examination showed him to be an obese man. I presume that in this day and age when one is confronted with an obese individual with hypertension he must always consider the possible existence of Cushing's syndrome. The existence of definite renal impairment is against such a diagnosis. However, we must appreciate the fact that some of our colleagues in New Haven have examined the pituitary glands in cases of nephritis and hypertension. I believe they have found that there are more basophilic cells in the pituitary glands of such cases than in those of normal individuals. What that proves, I do not know. I do not believe it can be interpreted to be of any etiological significance in either nephrosclerosis or glomerulonephritis. There is no further information here that would enable one to suspect the existence of a basophilic adenoma.

The man who made the physical examination evidently did not hear any pericardial friction rub. That does not rule pericarditis in or out. There is a note stating that costovertebral tenderness was present. Such a finding would be in keeping with a diagnosis of pyelitis. If present, it would help explain the frequent nocturia. However, the urine examinations did not support such a diagnosis. It is surprising that the history contains no further information concerning his shortness of breath. He did have a little pitting edema on one occasion. The respirations were increased. His liver was enlarged. The lungs were reported as negative. Therefore, we cannot say that he had evidence of cardiac failure due to hypertensive heart disease. The urine examinations revealed a specific gravity of 1.009 to 1.012. The urine concentration test showed failure to concentrate above 1.010. Therefore, one must admit the existence of renal impairment if the kidneys were unable to concentrate above 1.012. The red blood cell count was 3,750,000, with a hemoglobin of 70 per cent (Tallqvist). The red blood cell count is as a rule of some significance and of help in differentiating these two types of renal lesions. We expect people with a terminal glomerulonephritis to have a more severe anemia. We look upon the anemia as of some prognostic significance. However, we do know

that occasionally a patient may enter with terminal uremia of chronic glomerulonephritis and yet have a normal red blood cell count. However, they are in the minority, in the end stages of either nephrosclerosis or chronic glomerulonephritis. You always expect to find a more severe anemia in a nephritic than in a person with nephrosclerosis. The reduction in red blood cell count and hemoglobin here could perfectly well fit with either type of case. His nonprotein nitrogen was only 82 milligrams per 100 cubic centimeters. The finding of a nonprotein nitrogen of only 82 milligrams per 100 cubic centimeters in an individual who is unable to concentrate his urine or excrete more than 5 per cent of the phenolsulphonephthalein dye would favor a diagnosis of nephrosclerosis. We have here further evidence of impairment of kidney function as shown by a serum phosphorus of 6 milligrams per 100 cubic centimeters and a serum calcium of 8.5 milligrams per 100 cubic centimeters. This speaks for a terminal acidosis which we might see in either type of case. The lumbar puncture was negative except for increased pressure. This is of no diagnostic help. The question is of what did this man die? What is primary here? Did he have a terminal nephritis with a secondary hypertension or are we dealing with an individual who had a primary nephrosclerosis with secondary kidney impairment. Going on percentage figures, I should say that the history in this case was more in keeping with a diagnosis of nephrosclerosis than chronic glomerulonephritis. This man had no symptoms except headaches. With chronic glomerulonephritis one would expect the patient to complain of other symptoms such as weight loss, weakness, anorexia, indigestion, etc. In other words, patients with chronic Bright's disease usually have definite constitutional symptoms. This man had none. From the history alone I should be inclined to favor a diagnosis of nephrosclerosis rather than a diagnosis of chronic glomerulonephritis. I do think that the existence of nocturia for eighteen months prior to his first Out-Patient Department visit, two years before his final entry, can be used as an argument that he had some renal impairment at that time. It might be used also as an argument that he had a latent glomerulonephritis. However, I still believe that he should have had more in the way of other symptoms. I do not think that from the laboratory side we obtain much information that enables us to make the correct diagnosis. I think the red blood cell count favors nephrosclerosis and perhaps the nonprotein nitrogen of only 82 milligrams per 100 cubic centimeters might also be used as evidence in favor of it. Therefore, I shall hazard the guess that this man had a malignant hypertension, nephrosclerosis and hypertensive heart disease but I will not be surprised if Dr. Mallory tells me the opposite. I suppose one might wonder if there is any other complicating factor here. The headache was so severe and so persistent that one must consider the possibility of some other factor. However, it seems strange that he did not have any more symptoms or signs to direct us to the cause of such a complicating factor. I think it would be safer to assume that we are dealing with an individual with one of these two conditions and not a complicating factor in addition.

DR. FULLER ALBRIGHT: The service came to the same conclusion as Dr. Bauer.

DR. MYLES P. BAKER: I remember seeing this man in the Out-Patient Department and we had the same impression as Dr. Bauer, save that we considered a cerebral accident or cardiac failure a more likely eventuality. I do remember that the severe headaches were largely relieved, though the diastolic pressure was not lowered, by a little encouragement and a few suggestions that we felt at that time would not materially alter the prognosis.

CLINICAL DIAGNOSES

Hypertension, malignant.
Uremia.

DR. WALTER BAUER'S DIAGNOSES

Malignant hypertension.
Nephrosclerosis.
Hypertensive heart disease.

ANATOMIC DIAGNOSES

Nephrosclerosis, malignant type.
Cardiac hypertrophy, hypertensive type.
Arteriosclerosis, aortic and coronary, moderate.
Passive congestion—liver, spleen and kidneys.
Pulmonary edema.
Obesity.

PATHOLOGIC DISCUSSION

DR. TRACY B. MALLORY: The autopsy on this man showed a pair of kidneys weighing 280 grams, which is only a slight degree of contraction. The capsules stripped with some difficulty and left a granular surface which was quite red in character. The granules were both fine and coarse in type. In other words, the gross picture was entirely consistent with a malignant vascular nephritis. The microscopic examination entirely bears that out. There are few totally destroyed glomeruli, but the great majority show extensive hyalinization, occasionally with fresh fibrin thrombi in the capillary loops, but without proliferation of endothelial or epithelial cells. The afferent arteries of the glomeruli are extensively and uniformly involved, often with characteristic necrotizing lesions. The larger vessels show a marked

fibrous intimal thickening sometimes described as endarteritis. Also, the vessels in the other organs of the body show somewhat similar changes, very marked, as one would expect, in the spleen, but present also in the capsule of the adrenal, in the pancreas, and barely discernible in the liver. So that everything from beginning to end is entirely consistent with a malignant nephrosclerosis. I think there is little possibility of doubt in regard to the diagnosis.

The only other findings at the autopsy of significance were a considerably hypertrophied heart, as one would expect, and a moderately severe grade of coronary sclerosis. However, there was no occlusion of the coronary as yet, no myocardial scars and no terminal pericarditis. The lungs showed a quite severe pulmonary edema, probably an acute attack of very short duration, a rather characteristic terminal event in any type of nephritis.

DR. BAUER: I should like to ask a few questions. (1) Do you think you see an occasional case in whom you find evidence of the existence of both nephrosclerosis and chronic glomerulonephritis?

DR. MALLORY: I think one fairly often sees at autopsy a pair of extensively atrophied kidneys which microscopically show no progressive changes except in the vessels although both the clinical picture and the other autopsy findings suggest that the underlying difficulty is an old destruction of a large proportion of kidney substance by glomerulonephritis. Confirmatory evidence of the plausibility of such a hypothesis has appeared this last year in the interesting studies of Alan Moritz of Cleveland who was able to show that functionless glomeruli do not persist indefinitely as hyalinized scars as had generally been supposed in the past, but the majority disappear so completely that no scar is left at all. He showed this very prettily by glomerular counts and by special staining methods which demonstrated glomeruli in every stage of destruction.

DR. BAUER: They completely disappear.

DR. MALLORY: Yes; so that one cannot expect to find the traces of a glomerular lesion that occurred twenty years ago. The only evidence may be the tremendous reduction in the number of glomeruli.

DR. BAUER: What evidence exists to favor the view that malignant hypertension is caused by infection? How does the pathologist interpret the so-called hypertension crises?

DR. MALLORY: In answer to the first question I have a strong personal conviction that malignant hypertension is simply a very severe form of benign hypertension rather than a different disease and I doubt if it is dependent upon infection. I have to admit that occasionally pictures indistinguishable from malignant hypertension can be produced by infectious diseases such as periarteritis nodosa for instance, but that is an entirely different syndrome that happens to involve the same structures and produce the same picture.

DR. BAUER: Certain German investigators cite cases in which streptococcus throat infections were thought to have caused the hypertension.

DR. MALLORY: Fahr in particular supports strongly the theory of an infectious origin, but I think the opinion of pathologists and clinicians the world over is very steadily shifting away from that point of view. I cannot answer the other question.

DR. BAUER: It seems to me that the theories offered in the average textbook as to the cause of the so-called hypertension crises are not based on sound physiological reasoning. We always wonder if they do not represent a true vascular episode in which the patient did not present any localized signs.

DR. CHARLES S. KUBIK: I should think our findings here would tend to confirm that view; that where cerebral symptoms appear an organic lesion has developed in the brain. Even the fact that in large numbers of these cases the symptoms are transitory, even very quickly so, does not rule out actual occlusion. I think we have material which proves that.

CASE 21352

PRESENTATION OF CASE

A thirty-four year old American painter entered complaining of swelling of the neck and groins.

About four months before entry the patient noticed a single nodular swelling about the size of a golf ball in the left groin. At the same time there developed also two small rather hard nodules under the angle of the jaw on both sides. He consulted his physician who prescribed inunctions of Iodex, which he used for one month without any decrease in the size or character of the glands. At the end of this period they began to increase in size rather rapidly. The ones in the neck extended to include a chain of glands on each side. The single nodule in the groin increased in size and others appeared in the right groin. He visited his physician again and this time was given potassium iodide. One month before entry he was placed on Fowler's solution, 5 drops three times a day, which he took until the time of admission. There was no pain. Ten weeks before entry he began to raise phlegm which was often blood-tinged and gave him a feeling of discomfort. Shortly after the onset of the glandular swelling he noticed that he was unable to hear very well. There was always a pumping noise in his head. There was some bleeding from his gums, but there was no history of change in voice, cough or hemoptysis. About three weeks

before entry he developed shortness of breath, became rather weak and tired easily.

The family and marital histories are non-contributory.

He had been a painter during the past fourteen years. He had had the usual childhood diseases. Seventeen years before entry he had influenza.

Physical examination showed a well-developed and fairly well-nourished man with marked enlargement of his neck. The glands were discrete, firm, non-tender and varied in size from 2 to 8 centimeters in diameter. There was no redness or heat of the overlying skin. The axillary, epitrochlear and inguinal glands were all enlarged up to 8 centimeters in diameter. The heart and lungs were not remarkable. The firm edge of the spleen could easily be felt upon deep inspiration. Several purpuric spots were seen on the skin near the axillae.

The temperature was 98°, the pulse 88. The respirations were 20.

Examination of the urine was negative. The blood showed a red cell count of 3,120,000, with a hemoglobin of 55 per cent. The white cell count was 4,600. The smear showed 4 per cent polymorphonuclears, 19 large lymphocytes and 62 small lymphocytes. The stools were negative. A Hinton test was negative. The basal metabolism rate was plus 37, the icteric index 20, the serum protein 6.8 per cent.

X-ray examination of the chest was negative. There were no mediastinal masses.

On the third day his temperature started to rise, reaching 106°. The white blood cell count at this time was 6,600. A smear showed 3 per cent polymorphonuclears, 21 large lymphocytes and 76 small lymphocytes. Another white cell count made the following day was 950. The smear showed cells only of the lymphoblastic type.

He rapidly failed and died five days after entry, his temperature having remained around 106° for the last three days.

Differential Diagnosis

Dr. F. Dennette Adams: The history of fairly rapid development of nodules in the neck and groin is suggestive of some form of malignant disease, most likely lymphoblastoma of the leukemic, Hodgkin's or lymphosarcomatous type. Cancer or other tumor in the head, neck, chest or abdomen could produce metastases in the glands of the neck, possibly in the groin; but it would be unusual to have such a disease sufficiently far advanced to produce generalized adenopathy and yet manifest no local symptoms. The size and duration are against mononucleosis and other acute infections with adenopathy. Tuberculosis is possible but very improbable because of general distribution and the rapidity of growth; other types of granulomata are equally unlikely. Bleeding from the gums is typical of the leukemias and lymphoblastomas; the blood-tinged sputum is also common. It could be caused by collection in the throat of blood which oozed from the gums overnight, by congestion or by invasion by tumor tissue farther down. Deafness, due presumably to cellular infiltration of vestibule, middle ear or auditory nerve, is not uncommon in leukemia. The pumping noise one can assume is an associated symptom. Weakness, fatigue and dyspnea would be expected in a patient with what is obviously a severe and progressive disease.

Inunction of Iodex, of course, is a useless procedure in a case of this kind. I am astonished at the frequency with which such therapeutic methods are advocated. One sees them recommended for all sorts of swellings, including tumors of the breast, and as a result valuable time is frequently lost and harm actually done. In this instance, happily, since no form of therapy would have been of permanent value, there was no actual loss. Potassium iodide was worth a trial; arsenic has its place in the treatment of leukemia. One is always on the lookout for lead poisoning in a painter. There is nothing to suggest it in this case.

History will not supply the diagnosis; laboratory tests are essential, but on the basis of history alone one would be most suspicious of lymphoblastoma or leukemia.

The type of glandular swelling described in the physical examination almost excludes tuberculosis and other granulomata but supplies no added leads.

In leukemia one would expect to find at least some enlargement of the liver and greater enlargement of the spleen, although this is not always the case. Purpuric spots, like the bleeding gums, are consistent with lymphoblastoma of the leukemic type, rare with the Hodgkin's type.

The key to the diagnosis is the blood report—the lymphocytic formula, even in the absence of a higher total leukocyte count, throws the case into the group of the lymphatic leukemias. One would be justified in assuming, I think, that earlier there was a higher total leukocyte count, and that the present figure represents depression produced by arsenic therapy or the depression so frequently seen in the terminal stages, though it is possible that the low count may have persisted throughout the disease. The red cell count and hemoglobin are consistent. The high metabolic rate is an important characteristic of the disease. It is impossible to account positively for the high icteric index. It could be due to liver damage by the arsenic, or to partial biliary obstruction by leukemic infiltration.

The rapid downward progress with high fever, marked drop in the leukocyte count, and fatal termination is typical of leukemia, par-

ticularly of the acute type. To be sure, the duration is longer than usual for the acute case, which is more apt to last only a few weeks, and is short for the chronic case; but there are all gradations. One can speculate as to the influence of arsenic on the leukocyte count, although there are no other definite indications of arsenic poisoning (the dosage of fifteen drops of Fowler's solution daily for a month is not excessive), and also as to the possibility of terminal infection. There is no definite evidence in the record.

It seems to me that the only diagnosis which will fit the picture is lymphatic leukemia.

A PHYSICIAN: You do not think the question of lead plays any part in this?

DR. ADAMS: No.

A PHYSICIAN: Do you think the diagnosis is consistent with the white count of 950?

DR. ADAMS: Yes. The white count may drop in the terminal stages.

A PHYSICIAN: How do you account for the high temperature?

DR. ADAMS: Also a common terminal event.

A PHYSICIAN: Is there any other condition in which you get a lymphocyte ratio so high?

DR. ADAMS: Pertussis often shows a lymphocytic formula but rarely as high as this, although the total count would probably be higher. Mononucleosis might give a similar blood picture.

A PHYSICIAN: Do you see it very often in pertussis?

DR. ADAMS: One hears about it but I do not happen to see it as I rarely see children. Do you, Dr. Mallory?

DR. MALLORY: No.

A PHYSICIAN: How do you account for the metabolism?

DR. ADAMS: The metabolism is always high in myeloid leukemia. I do not know why. This finding is so consistent that it is used as a diagnostic factor in such cases. It may be but is not necessarily high in lymphatic leukemia.

A PHYSICIAN: Do you feel that the white cell count had been this low throughout?

DR. ADAMS: I believe it was probably high earlier in the disease but would prefer Dr. Mallory's opinion.

DR. MALLORY: It could have been higher before or it could have been this low or lower throughout.

A PHYSICIAN: Do you ordinarily get such a count with leukemia?

DR. MALLORY: Not ordinarily, but I have seen cases start high and fall below normal and also cases which start at a low level and later rise to 40,000 or more.

CLINICAL DIAGNOSES

Lymphatic leukemia.
Bronchopneumonia.

DR. F. DENNETTE ADAMS' DIAGNOSIS

Lymphocytic leukemia, acute.

ANATOMIC DIAGNOSES

Lymphoblastoma, aleukemic leukemic type.
Aplastic anemia, terminal.
Bronchopneumonia.

PATHOLOGIC DISCUSSION

DR. MALLORY: The autopsy showed generalized lymph node enlargement, a normal-sized liver without any sign of leukemic infiltration and a spleen that was only moderately enlarged, 550 grams, which is small for leukemia. There was a terminal pulmonary infection which was peculiar looking histologically because there was a reaction of fibrin and red cells but no leukocytes whatever. In other words, it looks like the pneumonic reaction in agranulocytosis and I think that fits his terminal condition. As I remember it, there was no differential to go with that final white cell count, but there were probably no polymorphonuclears at all.

In true leukemia you expect to find the bone marrow completely flooded with leukemic cells —so many that all other elements are displaced and you have to hunt hard for islands where the red cells, megakaryocytes and normal white cells are being formed. Instead this patient has a completely aplastic marrow in which we could not find either normal hematopoiesis or leukemic infiltration. If you gave me the sections of the bone marrow and told me nothing about the history I would call it aplastic anemia, but it is quite obvious that is not the whole diagnosis.

Microscopic sections of the lymph nodes showed a perfectly typical lymphoma and the spleen showed an infiltration consistent with leukemia. The diagnosis of aplastic anemia could not explain the lymph nodes and could not explain the spleen. A diagnosis of lymphoma in leukemic form does not explain the bone marrow. We have to make two diagnoses. There is no question that it is some form of lymphoma of which there is postmortem evidence only in the lymph nodes and spleen. It was most probably leukemic and at one time the bone marrow was involved. Then something happened—probably pretty suddenly—and knocked out all those cells in the bone marrow and produced a final picture that looks like complete aplasia of the bone marrow. The question as to what that factor was comes up. We have had one other proved leukemia in whom we did a sternal puncture two weeks before his death and found a typical leukemic infiltration with big unclassified cells. Two weeks later he died and showed a completely aplastic marrow. In the interval he developed an acute streptococcus infection for which he received no medication.

I do not know whether it was part of the leukemia per se or secondary to the streptococcus infection. In this man there is evidence of a terminal infection but apparently of only short duration—just the last day or two of his life. I do not believe that infection could have knocked out the bone marrow so completely in such a short length of time. He had received Fowler's solution for a long time which is reported sometimes to knock out the bone marrow badly. That is another possibility. He had not received any x-ray treatment.

A PHYSICIAN: Is it not said that x-rays will stimulate polymorphonuclear production?

DR. MALLORY: I have heard that claimed. I do not feel very confident about it. I think they might sometimes but I should be more afraid of their depressing them.

DR. ADAMS: Considering the extent of his bone marrow destruction one would expect the red cell count to have been lower. I suppose it might have been so recorded had further observations been made before death.

DR. MALLORY: He was in the hospital only five days and a good deal of the destruction of the bone marrow must have occurred in that five day period. There was only a single red cell count.

DR. ADAMS: Did you account for the head symptoms?

DR. MALLORY: We did not have permission to examine the head. However, Dr. Soma Weiss of the City Hospital recently has looked up all the leukemias at the City Hospital and here at the Massachusetts General Hospital. He has found evidence of much more frequent central nervous system involvement than is generally supposed.

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THERE WERE GIANTS IN THOSE DAYS

IN the Educational Symposium which appeared recently in the *Journal*, the history of the Massachusetts Board of Registration in Medicine was reviewed briefly, after noting some of the outstanding points in the history of the movement which led to the enactment of the statute of 1894, by which the Board was created.

We are removed from those days only forty years, according to the calendar, but from the spirit of the Victorian age, then passing off the stage, by seeming aeons of difference. It is difficult for us to realize the emotional excitements of the medical controversies of the nineteenth century, and the sectarian bitterness with which some of the antagonists arrayed themselves for battle. The questions which presented opportunities for the generation of so much heat we have forgotten, and when they are recalled to us we wonder if we could ever get so excited about anything.

For thirty-five years, there had been no statute controlling the practice of medicine in Massachusetts except the criminal law, and since the other states, except one, had some sort of medical practice act, for years there had been seeping into Massachusetts many of the outcasts from other states. The situation has a familiar parallel to-day.

It is impossible for us who have not lived through it to realize the strength and the character of the opposition to the medical practice act of 1894, which had to be overcome, and to the credit of the leaders of the medical profession of those days, was overcome. The names of the men who took an active part are well known to us. What we forget is the clearness of vision, and the earnestness of purpose and the dogged determination to overcome, which characterized them, of whose labors we reap the harvest.

Note the contemporary characterization of the opposition. "Medical blacklegs of all kinds, deceitful clairvoyants, long haired spiritualists, necromancers, wizards, witches, seers, magnetic healers, pain charmers, big Indian and Negro doctors, abortionists, harpies who excite the fears and prey on the indiscretions of the young of both sexes, who treat venereal diseases with the utmost secrecy and dispatch, who have good facilities for providing comfortable board for females suffering from any irregularity or obstruction, who sell pills which they are particular to caution patients when pregnant against using."

There has been some progress in forty years. The opposition to progress has changed its face. To meet and overcome this opposition, there is needed to-day the same clear thinking, the same determination, the same valor, which the giants of that day possessed, and of which the tradition has become our inheritance.

THE INFANTILE PARALYSIS SITUATION IN MASSACHUSETTS

THE incidence of infantile paralysis in Massachusetts is considerably larger than was expected earlier in the year. Up to August 21, the State Department of Public Health had reports of 345 cases and the expectation is warranted that by the time this statement appears there will have been reported over four hundred cases.

The important centers of the outbreak of this disease are Boston, Fall River, the North Shore and the Merrimac Valley. The western part of the State has been comparatively free from invasion thus far.

By advice of the State Department of Public Health and permission of the Editor of the

Journal of the American Medical Association an article written by Dr. Arthur T. Legg, which was published with others in connection with the exhibit on Poliomyelitis at the New Orleans Session of 1932, appears on page 415 of this issue.

This will give approved information relating to the aftercare of patients with this disease and correct the attitude held by some. In many cases, delay in treating these patients has made a reasonable degree of recovery impossible. Expert opinion and correct physiotherapy often determine the future condition of these patients. The dictum that manipulation and massage are to be avoided during the sensitive stage should be followed. The family physician can, with advantage to his patient and himself, secure early expert advice in every doubtful case.

SCHOOL DAYS

It may be a small kindness, from the point of view of the school child, to issue a reminder in August that school days will soon be upon us. For the older person, however, who must bear some of the responsibility for this educational venture, whether parent, teacher or physician, there are certain preparations which must be borne in mind and the earlier they are looked to the better. Some two million children in the land of the free and the home of the brave will be initiated into the mysteries of academic life this fall. Before entering the public schools of many of our states they must be vaccinated. All of them should be, whether it is required or not; whether it is public or private school in which they are to be matriculated.

A lesser number, unfortunately, will have been immunized against diphtheria. Here the advice of the family physician or pediatrician will carry weight, and advice on this important subject should be given voluntarily. In other ways how well is the child physically equipped to embark upon his scholastic career? Wise parents will have ascertained beforehand if their children's hearing is unimpaired, their vision normal and their respiratory tracts unhampered by obstructing adenoids or diseased tonsils.

It is the first important step that the child is taking, away from the affectionate security of his home; he is going into the outside world at last, not as a tourist but for a purpose and he should be prepared to meet that purpose without handicap.

The teacher, the school nurse and the school physician have also their responsibilities to shoulder. Physical or mental defects in the child, hitherto unnoticed, must be recognized, and the proper machinery set in motion to correct them if they are remediable. It must be borne in mind that many children, for the first time in their lives, will be exposed to a barrage of infectious diseases, and their first year in school will be the year when they are most susceptible to these contacts. Such exposures should be reduced to a minimum by teacher and nurse, who will remember that the common cold is an acute infection, often dangerous and highly communicable, even if it is they themselves who are harboring it!

THIS WEEK'S ISSUE

Contains articles by the following named authors:

Mixter, William Jason. B.S., M.D. Harvard University Medical School 1906. F.A.C.S. Visiting Surgeon, Massachusetts General Hospital. Address: 319 Longwood Avenue, Boston. Associated with him is

Ayer, James B. A.B., M.D. Harvard University Medical School 1907. Chief of Neurological Service, Massachusetts General Hospital. Professor of Neurology, Harvard University Medical School. Address: 319 Longwood Avenue, Boston. Their subject is "Herniation or Rupture of the Intervertebral Disc Into the Spinal Canal. Report of Thirty-Four Cases." Page 385.

Hoover, W. B. M.D. Washington University School of Medicine, St. Louis, Missouri 1922. Laryngologist, New England Deaconess Hospital. Associate Otorhinolaryngologist, New England Baptist Hospital. Otorhinolaryngologist, Lahey Clinic. His subject is "The Syndrome of Anemia, Glossitis, and Dysphagia." Page 394. Address: 605 Commonwealth avenue, Boston.

Massell, Benedict F. M.D. Harvard University Medical School 1931. Resident Physician, House of the Good Samaritan. Address: 25 Binney Street, Boston. Associated with him is

Solomon, Philip. M.D. Harvard University Medical School 1930. Assistant in Neurology, Harvard University Medical School. Junior Visiting Neurologist, Boston City Hospital. Address: Boston City Hospital, Boston. Their subject is "Epidemic Benign Myalgia of the Neck." Page 399.

Faxon, Henry H. A.B., M.D. Harvard University Medical School 1925. F.A.C.S. Staff Assistant Surgeon, Massachusetts General Hospital. His subject is "Coexisting Intrauterine and Extrauterine Pregnancy." Page 401. Address: 264 Beacon Street, Boston.

Halbersleben, David. A.B., M.D. Harvard University Medical School 1928. Junior Associate in Medicine, Peter Bent Brigham Hospital, Boston. Visiting Physician, Channing Home, Brookline. His subject is "Coronary Occlusion

in Community Practice." Page 403. Address: 3 Conway Street, Roslindale.

STELLHORN, CHESTER E. A.B., M.D. University of Michigan 1929. Formerly, Intern at Providence Hospital, Detroit; Research Fellow in Pathology, Detroit College of Medicine and Surgery; Pathologist, Women's Hospital, Detroit; and Resident, Orthopedic Surgery, Long Island College Hospital, Brooklyn. Now, Resident Surgeon, Cumberland Hospital, Brooklyn. His subject is "Jacob Bigelow, M.D., LL.D." Page 405. Address: Cumberland Hospital, 39 Auburn Place, Brooklyn, New York.

BALL, C. F. M.D. American Medical Missionary College 1902. F.A.C.S. Surgeon, Rutland Hospital. His subject is "Irradiation Treatment of Tumors. Late European Developments." Page 407. Address: 56½ Merchants Row, Rutland, Vermont.

MCCLEARY, G. F. M.D. (Cantab.), D.P.H. Formerly, Deputy Senior Medical Officer, Ministry of Health, and Principal Medical Officer, National Health Insurance Commission (England). Now, Medical Officer of Health, Battersea, Hampstead, Bedfordshire. Examiner in Public Health, University of Liverpool. His subject is "How Grievances Are Dealt with Under the English Health Insurance Scheme." Page 412. Address: Milbank Memorial Fund, 40 Wall Street, New York City.

LEGG, ARTHUR T. M.D. Harvard University Medical School 1900. F.A.C.S. Assistant Professor of Orthopedic Surgery, Harvard University Medical School. Associate Surgeon, Children's Hospital. Consulting Orthopedic Surgeon, Lowell General and St. Joseph's Hospitals, Lowell; also at Chelsea Memorial Hospital, Chelsea. His subject is "Paralytic Treatment Other Than Respiratory. The Important Rules in the After-Care of Poliomyelitis." Page 415. Address: 319 Longwood Avenue, Boston.

WHITE, JAMES C. A.B., M.D. Harvard University Medical School 1923. F.A.C.S. Assistant Professor of Surgery, Harvard University Medical School. Associate Surgeon, Massachusetts General Hospital. His subject is "Progress in the Surgery of the Autonomic Nervous System in 1933 and 1934." Page 416. Address: Massachusetts General Hospital, Boston.

MISCELLANY

A NATIONAL HEALTH SURVEY

The President of the United States has approved an allotment of $3,450,000 for the employment of 3500 workers on relief rolls to operate in nineteen states to get health histories of families. The work will be directed by the United States Public Health Service.

Especial attention will be devoted to heart diseases and to illnesses due to certain occupations or income groups. The underlying purpose is to acquire information not otherwise available in hospital records and reports of other institutions for the use of research scientists and doctors.

DR. FRANCIS R. MAHONY BECOMES A MEMBER OF THE MASSACHUSETTS BOARD OF REGISTRATION IN MEDICINE

In order to meet the provision in the law that no Medical Society may have majority representation on the Massachusetts Board of Registration in Medicine, Dr. Francis R. Mahony has resigned from the Massachusetts Medical Society. He was nominated by Governor Curley to fill the position made vacant by the retirement of Dr. Hovey of Springfield.

This action by Dr. Mahony calls for appropriate recognition by the Society of the sacrifice of this membership. He is now the second doctor who has given up membership in the Society in order to serve the State in this important capacity.

A PLAN TO MEET THE MEDICAL NEEDS OF LOW INCOME GROUPS

A Committee on Medical Economics of the North Side Branch of the Chicago Medical Society has studied the problem relating to meeting the medical needs of low income groups. Its first conclusion is that "The responsibility of providing that care for the indigent sick should rest with all tax-payers." The rest of the report is devoted to a plan for dealing with the group whose incomes are between $750 and $1,000. The attendance of many patients at the advertising clinics is deplored because such organizations have entrenched themselves in a field which should have been controlled by organized medicine. The suggested remedy is set forth as follows: "Why should the medical profession be expected to donate services and at the same time pay in taxes its share of the cost of sickness among the indigent? Remuneration for this medical service should be added to the other expenses connected with sickness among these people, and the total should be carried equitably by all tax-payers."

The purpose of this plan is commendable and the experiment, if put into operation, will be watched with interest. Success will depend on the devotion and ideals of the doctors participating in the plan and the efficiency of the social service adjunct. Much of the trouble with such schemes is likely to be lack of general coöperation or dissensions among those who carry out the details, but this is no excuse for indifference on the part of the medical profession which long ago should have devoted more thought to the medical needs of the groups in the low income brackets.

ANTERIOR POLIOMYELITIS CASES FOR 1935

City or Town	Jan.-May	June	July	August 1-17	August 19-24	Total to Date For Year
Brewster	0	0	0	0	1	1
Fall River	0	0	6	32	12	50
New Bedford	0	0	0	0	1	1
Plymouth	0	0	0	1	0	1
Somerset	0	0	0	0	1	1
Westport	0	0	0	1	1	2
Braintree	0	0	0	1	0	1
Brockton	0	0	0	4	1	5
Dedham	0	0	0	1	1	2
Hopkinton	0	0	0	0	1	1
Quincy	0	0	0	0	3	3
Weymouth	1	0	1	1	1	4
Arlington	0	0	0	2	0	2
Belmont	0	0	0	2	0	2
Boston	0	1	19	92	40	152
Brookline	0	0	0	2	0	2
Cambridge	1	0	1	5	3	10
Chelsea	0	0	0	6	1	7
Concord	0	0	0	1	0	1
Everett	0	1	1	1	6	9
Malden	1	0	0	2	1	4
Medford	0	0	0	2	1	3
Melrose	0	0	0	1	1	2
Newton	0	0	0	0	1	1
Revere	0	0	0	2	0	2
Somerville	0	0	0	4	1	5
Waltham	1	0	2	6	1	10
Watertown	0	0	1	2	3	6
Winthrop	0	0	0	2	2	4
Amesbury	0	0	0	1	2	3
Andover	0	0	1	1	0	2
Beverly	0	0	1	5	2	8
Billerica	0	0	0	2	0	2
Danvers	0	0	0	0	2	2
Gloucester	1	0	0	2	0	3
Haverhill	0	0	1	7	7	15
Ipswich	0	0	0	1	0	1
Lawrence	0	1	3	0	0	4
Lowell	0	0	3	7	6	16
Lynn	0	0	2	4	0	6
Manchester	0	1	0	0	0	1
Marblehead	0	0	1	0	0	1
Newburyport	0	0	0	0	1	1
North Andover	0	0	0	0	2	2
Peabody	0	0	0	1	0	1
Salem	0	0	0	1	0	1
Saugus	0	0	0	1	0	1
Swampscott	0	1	0	1	0	2
Westford	0	0	0	0	1	1
Fitchburg	0	0	0	0	2	2
Marlboro	0	0	0	1	0	1
Millbury	1	0	0	0	0	1
Northbridge	0	0	0	1	0	1
Shrewsbury	2	0	0	0	0	2
Westboro	0	0	0	2	0	2
Worcester	0	0	1	0	2	3
Chicopee	0	1	0	0	0	1
Northampton	0	0	1	0	0	1

Springfield	0	0	1	1	1	3
Greenfield	0	0	0	1	0	1
Pittsfield	0	0	0	1	0	1
Total	8	6	46	214	112	386

A STUDY OF THE HEALTH AGENCIES OF BOSTON

In 1934 Dr. Haven Emerson and Anna C. Phillips made a comprehensive study of the organized care of the sick and of the health agencies of Boston for the committee on the study of the social and health agencies of the city. The report of this study has been abstracted and the findings and recommendations of so well recognized an authority as Dr. Emerson are well worth careful consideration.

The problems presented to the committee primarily concerned hospitals, out-patient services, medical social service, domiciliary care and health agencies. So far as hospital beds for acute conditions and obstetrics are concerned, Boston apparently has an excessive number in relation to the population needs of the city proper; however, Boston's traditional provision for hospital care for patients from the Metropolitan area beyond the city limits and from residence elsewhere in Massachusetts and other New England states is probably sufficient justification for this apparent excess.

A serious inadequacy exists in the institutional provision for chronic invalids, evidenced both by the lists of persons waiting their turn for admission to the existing six institutions, and by the proportion of patients in the general hospitals who should be cared for in institutions for the chronically ill. Studies by the Massachusetts Department of Public Health in 1929, 1930 and 1931 also indicate that Boston lacks sufficient care for chronic disease.

Existing facilities for convalescent care are also seriously inadequate. Boston has approximately 13,440 patients annually who would benefit by convalescent care, with sufficient beds at present for not over half this number.

Domiciliary medical care, long handled by the Boston Dispensary, the Massachusetts Memorial Hospitals, the Medical Mission Dispensary, and the Jamaica Plain Dispensary, has been a bone of contention, and the city has only recently recognized its responsibility in the matter.

Visiting nurse service has been provided by the Community Health Association, and it is time that the municipality recognized its responsibility for appropriate care of the dependent sick whether the cost of care falls upon the hospitals of the city, the hospital operated by private control, or upon the Community Health Association Visiting Nurses.

In social service work, additional personnel is needed in the medical social service department of the City Hospital.

It is recommended, in conclusion, that the city should make contractual agreements with the privately controlled hospitals to care for patients at times when the general medical and surgical beds at the Boston City Hospital are occupied to normal or ninety per cent of the capacity of the hospital; that the city should provide either by an externe service at the City Hospital, or by contractual agreement with private organizations, domiciliary care for persons eligible for free care; that a home for chronic patients be provided on the mainland; that hospitals or houses devoted to the care of convalescent patients are needed to relieve the general hospitals of the care of those patients who no longer need the costly and elaborate skill and equipment required during acute illness.

It is further recommended, among other things, that the private hospitals go forward with plans at present under consideration to make possible for persons of moderate means the payment for hospital care by periodic payment on a membership basis of sums sufficient to assure them of hospital care at such time as subsequent sickness may require. Various minor institutions, it is believed, should discontinue their activities, and various possible mergers in the interests of efficiency and economy are suggested.

THE CONTROL OF COMMUNICABLE DISEASES

In the Bulletin of the United States Public Health Service, Volume 50, Number 32, August 9, 1935, there appears the revision of previous reports covering the control of communicable diseases. This is the product of the Subcommittee on Communicable Disease Control of the Committee on Research and Standards of the American Public Health Association, and it has been approved by the United States Public Health Service.

This publication should be in the offices of all practicing physicians, for it sets forth in concise form the definitions of terms employed in public health rules and regulations, a list of the diseases requiring notification to health authorities, the diagnosis, etiology, source of infection, mode of transmission, incubation period, period of communicability, susceptibility and immunity, prevalence, methods of control and general measures to be observed.

When practitioners learn and apply all that is set forth in this publication, the dangers incident to communicable disease will be greatly modified and physicians will be, more effectively, adjuncts to public health authorities.

DR. JOHN P. SUTHERLAND IS ON A MEDITERRANEAN CRUISE

On August 24, Dr. John P. Sutherland sailed from New York on the SS. Roma for a Mediterranean cruise.

COMPARISON OF DISEASE INCIDENCE IN CONNECTICUT WITH 1934 AND SEVEN YEAR AVERAGE

MONTH ENDING AUGUST 17, 1935

	1935					1934			
Diseases	Week ending July 27	Week ending August 3	Week ending August 10	Week ending August 17	Average cases reported for week corresponding to Aug. 17 for past seven years	Week ending July 28	Week ending August 4	Week ending August 11	Week ending August 18
Chicken Pox	22	10	3	8	8	12	14	8	5
Conjunctivitis, Infectious	1	—	—	—	—	1	—	—	—
Diphtheria	9	2	2	4	7	—	—	3	2
Dysentery Bacilliary	2	1	1	2	—	1	2	1	—
Encephalitis Epidemic	—	—	—	1	—	—	—	1	—
German Measles	14	5	5	9	—	2	1	3	—
Influenza	—	1	—	—	1	—	—	1	1
Malaria	—	—	—	1	—	—	—	—	1
Measles	68	35	26	15	14	32	32	16	10
Meningococcus Meningitis	1	1	—	1	—	—	—	1	7
Mumps	13	14	9	7	7	13	14	4	—
Paratyphoid Fever	—	1	12	5	—	2	—	2	2
Pneumonia (Broncho)	8	10	6	3	6	5	5	4	2
Pneumonia (Lobar)	4	5	4	3	5	3	6	4	—
Poliomyelitis	5	10	22	43	12	—	1	1	—
Scarlet Fever	15	8	11	8	9	9	4	3	3
Streptococcus Sore Throat	1	—	—	4	—	2	—	1	—
Tetanus	1	1	1	—	—	1	—	—	—
Trachoma	1	—	—	—	—	—	—	—	—
Trichinosis	2	—	—	—	—	—	—	—	—
Tuberculosis (Pul.)	17	29	38	20	31	20	32	25	32
Tuberculosis (O. F.)	3	2	3	1	3	3	2	—	2
Typhoid Fever	2	—	1	5	3	2	3	3	1
Undulant Fever	—	1	2	—	—	1	1	—	—
Whooping Cough	42	51	45	35	43	80	53	43	35
Gonorrhea	50	37	17	21	35	60	63	30	36
Syphilis	56	53	32	23	37	68	61	28	61

Remarks: No cases of Asiatic cholera, glanders, plague or yellow fever during the past seven years.

INTERNATIONAL UNION AGAINST TUBERCULOSIS

The Executive Committee and the Council of the International Union Against Tuberculosis, whose Secretary General is Prof. Fernand Bezançon, met in Paris, at the Headquarters of the Union, 66, Boulevard St-Michel, on July 10 and 11, 1935, under the chairmanship of Dr. Piestrzynski, Under Secretary of State for Poland. Delegates from twenty countries attended this meeting. The administrative meeting of the Council was devoted to the preparation of the programme of the Conference of Lisbon which is due to take place on September 8, 9 and 10, 1936. The agenda of this Conference are now definitely settled and will include the three following subjects: "Radiological Aspects of the Pulmonary Hilum and Their Interpretation", opening report of Prof. Lopo de Carvalho (Portugal); "Primary Tuberculosis Infection in the Adolescent and the Adult", opening report by Dr. Olaf Scheel (Norway); "The Open Case of Tuberculosis in Relation to Family and Domestic Associates", opening report by Sir Henry Gauvain (Great Britain).

At the scientific meeting of the Council Prof. Lyle Cummins (Cardiff) occupied the Chair. Professor Madsen, of Copenhagen, submitted a report on "Tuberculin Standardization and Tuberculin Tests". Dr. Kendall Emerson, Managing Director of the National Tuberculosis Association, gave an account of the work of Dr. Long and his collaborators who claim to have isolated the active principle of tuberculin. In a discussion in which Prof. Madsen, Prof. Lyle Cummins, M. Boquet, Prof. F. Bezançon, Professor Sergent, Prof. Debré, Dr. Lesné, Dr. Rist, Dr. Troisier, Dr. Saenz, . . . etc., took part, the respective merits of Pirquet's cuti-

reaction and Mantoux's intradermal test were compared. The majority of the French speakers expressed a preference for the former method while their colleagues from other countries spoke on behalf of Mantoux's test. They all agreed on the advisability of adopting a standard tuberculin and a uniform tuberculin test.

THE ILLEGAL PRACTICE OF VETERINARY MEDICINE

In a letter to Dr. Begg, Secretary of the Massachusetts Medical Society, Dr. E. W. Babson, Secretary of the Board of Registration in Veterinary Medicine, has called attention to a number of complaints received by that Board that physicians have practiced one or more branches of veterinary medicine such as vaccinating dogs against rabies and distemper, treating fractures and eye troubles, and have collected fees for some of this work.

Section 59 of Chapter 112 of the General Laws of Massachusetts provides that any person who practices or attempts to practice veterinary medicine shall, except as provided in section sixty-five, be punished by a fine of not less than fifty dollars or imprisonment for not less than two months or both. Exemptions set forth in section 60 permit veterinary service by a person in case of an emergency and by farmers who may be serving neighbors.

No exemptions are given for physicians even in treating their own dogs, so far as the wording of the law appears in the copy submitted. Dr. Babson evidently does not want to have to proceed against physicians and hopes that general knowledge of the law will relieve him of this necessity.

RELIABLE APPARATUS

The *New England Journal of Medicine* has received from the American Medical Association a small pamphlet containing a list of the apparatus accepted by the Council on Physical Therapy, the first one published under the direction and supervision of the Council. In addition to the list and description of accepted apparatus, the pamphlet contains indications for the use of each type and a statement relative to efficacies and dangers.

This pamphlet is a real contribution on the part of the American Medical Association in behalf of rational therapeutics and is an effort to help place physical therapy on a sound, scientific basis for the benefit of the medical profession.

One of the purposes of the Council on Physical Therapy is to protect the medical profession, and thereby the public, against inefficient and possibly dangerous apparatus and against misleading and deceptive advertising in connection with the manufacture and sale of devices for physical therapy.

Apparatus Accepted includes all the devices accepted by the Council prior to May, 1935. Any physician can obtain this pamphlet free by writing to the Secretary, Council on Physical Therapy, A. M. A., 535 North Dearborn Street, Chicago, Illinois.

MEMBERS OF THE COUNCIL

H. E. Mock, M.D., D.Sc., Associate Professor of Surgery, Northwestern Medical School, Chicago, *Chairman.*

W. W. Coblentz, Ph.D., Radiation Physicist, Bureau of Standards, Washington, D.C.

J. S. Coulter, M.D., D.T.M., Assistant Professor of Physical Therapy, Northwestern University Medical School, Chicago.

A. U. Desjardins, M.S., M.D., Assistant Professor of Radiology, Mayo Foundation, and Director, Division of Radiology, Mayo Clinic, Rochester.

F. J. Gaenslen, M.D., Professor of Orthopedic Surgery, University of Wisconsin Medical School, Milwaukee.

W. E. Garrey, Ph.D., M.D., Professor of Physiology, Vanderbilt University School of Medicine, Nashville.

Yandell Henderson, Ph.D., Professor of Physiology, Yale University, New Haven.

Howard T. Karsner, M.D., Professor of Pathology, Western Reserve University School of Medicine, Cleveland.

Frank H. Krusen, M.D., Associate Dean, Temple University School of Medicine, Philadelphia.

G. M. MacKee, M.D., Professor of Dermatology and Syphilology, and Director of the Department of Dermatology and Syphilology, New York Post-Graduate Medical School and Hospital, New York.

R. B. Osgood, A.B., M.D., John B. and Buckminster Brown Professor of Orthopedic Surgery, Emeritus, Harvard University Medical School, Boston.

Ralph Pemberton, M.S., M.D., Professor of Medicine, Graduate School of Medicine, University of Pennsylvania.

Olin West, M.D. (Ex-Officio), Secretary and General Manager of the American Medical Association, Chicago.

Morris Fishbein, B.S., M.D. (Ex Officio), Editor of the *Journal of the American Medical Association*, Chicago.

Howard A. Carter, B.S., in M. E., Secretary of the Council on Physical Therapy, American Medical Association, 535 North Dearborn Street, Chicago.

EXTENSION EDUCATION IN PHYSICAL THERAPY

One of the aims of the Council on Physical Therapy of the American Medical Association is to promote extension education in physical therapy.

The Committee on Education of the Council believes that one of the best ways of extending postgraduate instruction in physical therapy is to arrange for practical talks to be given before state, county or other medical societies. Experience, especially in New York and Pennsylvania, has shown that such programs are eagerly received by the profession.

The Council is prepared to assist medical societies by furnishing general advice as to programs and by suggesting qualified personnel.

The following topics are offered as being of interest to the general practitioner:

The Present Status of Physical Therapy
Physical Therapy in General Practice
Body Mechanics and Posture Training
Massage—Indications and Effects
Pathological Conditions Helped by Physical Therapy
Therapeutic Exercise
Radiation Therapy
Hydrotherapy
Fever Therapy
Diathermy, Medical and Surgical, Including Short Wave.

Motion pictures on the following subjects are available for loan:

Massage—Technic
Graduated Active Motion
Occupational Therapy
Effects of Heat and Cold on Blood Circulation
Effects of Massage on Blood Circulation.

In addition, exhibits on physical therapy can be arranged in conjunction with the Committee on Scientific Exhibit, available on request.

Anyone desiring help in program planning or loans of films or exhibits is advised to write the Secretary, Council on Physical Therapy, A. M. A., 535 North Dearborn Street, Chicago, Illinois.

HEALTH OFFICERS' MONTHLY STATEMENT OF VENEREAL DISEASES IN NEW ENGLAND FOR JUNE, 1935

State	Syphilis		Gonorrhea	
	Cases reported during month	Monthly case rates per 10,000 population	Cases reported during month	Monthly case rates per 10,000 population
Connecticut	230	1.40	129	.78
Maine	35	.44	53	.66
Massachusetts	418	.97	526	1.22
New Hampshire	18	.38	16	.34
Rhode Island	79	1.13	52	.74
Vermont	20	.55	35	.97

—*Treasury Department Public Health Service.*

WEIGHT REDUCER CAUSES BLINDNESS GOVERNMENT AGAIN WARNS PUBLIC

"Blindness from the use of dinitrophenol for reducing weight has not stopped the use of the drug in spite of repeated warning," says W. G. Campbell, Chief of the Federal Food and Drug Administration.

The eye cataracts observed in dinitrophenol poisoning develop with a rapidity and malignancy hitherto unknown, and result in total blindness within a comparatively short time. This drug may produce acute poisoning, the symptoms of which are nausea, stomach and intestinal distress, sweating, flushed skin, high fever, rapid breathing, and muscular rigor followed by death. The drug also damages the liver, kidneys, heart and sensory nerves. It produces agranulocytosis, a blood disorder also noted in cases of poisoning with amidopyrine, a common ingredient of medicines for the relief of pain.

Dinitrophenol is sold under many fanciful names sometimes accompanied by a statement of the presence of the drug itself. Some of the names under which it has been or is now being sold are reported by the Food and Drug Administration as follows: Nitromet, Dinitrolac, Nitra-Phen, Dinitriso, Formula 281, Dinitrose, Nox-Ben-Ol, Re-Du, Aldinol, Dinitrenal, Prescription No. 17, Slim, Dinitrole, Tabolin and Redusols.

RÉSUMÉ OF COMMUNICABLE DISEASES IN MASSACHUSETTS FOR JULY, 1935

Disease	July 1935	July 1934	5-Yr. Average*
Anterior Poliomyelitis	46	20	37
Chicken Pox	379	371	357
Diphtheria	30	43	109
Dog Bite	1208	1405	866
Epidemic Cerebrospinal Meningitis	8	6	5
Gonorrhea	594	559	609
Lobar Pneumonia	163	155	113
Measles	595	775	1100
Mumps	241	207	241
Scarlet Fever	281	270	400
Syphilis	339	291	325
Tuberculosis Pulmonary	332	280	367
Tuberculosis Other Forms	29	40	51
Typhoid Fever	13	17	21
Undulant Fever	3	0	0
Whooping Cough	347	930	673

*Based on figures for the preceding five years.

RARE DISEASES

Actinomycosis was reported from Boston, 1.

Anterior poliomyelitis was reported from Andover, 1; Beverly, 1; Boston, 19; Cambridge, 1; Everett, 1; Fall River, 6; Haverhill, 1; Lawrence, 3; Lowell, 3; Lynn, 2; Marblehead, 1; Northampton, 1; Springfield, 1; Waltham, 2; Watertown, 1; Weymouth, 1; Worcester, 1; total, 46.

Dysentery (amebic) was reported from Worcester 1.

Dysentery (bacillary) was reported from Quincy, 1.

Encephalitis lethargica was reported from Salem, 1.

Epidemic cerebrospinal meningitis was reported from Boston, 3; Fall River, 1; Gloucester, 1; Malden, 1; Revere, 1; Shrewsbury, 1; total, 8.

Malaria was reported from Boston, 1.

Pellagra was reported from Boston, 1; Salem, 1; Stoughton, 1; total, 3.

Septic sore throat was reported from Boston, 2; Cambridge, 1; Dighton, 1; Fall River, 1; Lowell, 1; Lynn, 3; Malden, 1; Medford, 4; Quincy, 1; total, 15.

Tetanus was reported from Boston, 1; Lynn, 1; Pelham, 1; Quincy, 1; total, 4.

Trachoma was reported from Boston, 4; Fitchburg, 1; New Bedford, 1; Revere, 1; total, 7.

Trichinosis was reported from Brockton, 1.

Undulant fever was reported from Williamsburg, 2; Worcester, 1; total, 3.

Infantile paralysis, through July, showed nothing alarming. The cases were localized in Boston, Fall River, and the northeastern area.

Diphtheria was reported to less than one quarter of the July, 1932, figure.

Typhoid fever showed its usual summer increase but compares well with last year's low incidence.

Pulmonary tuberculosis and lobar pneumonia showed a slight, though not remarkable, increase over the previous year's figures.

Tuberculosis (other forms) had its lowest reported July incidence.

Scarlet fever, for the second consecutive month, was reported to a higher figure than for the previous year, which may mean an increased prevalence this coming fall and winter.

Measles, epidemic cerebrospinal meningitis, chicken pox and mumps showed nothing remarkable.

German measles, while on the decline for the year, had its highest reported July morbidity.

CORRESPONDENCE

AN APPEAL FOR DATA TO BE INCORPORATED IN THE DIRECTORY OF THE AMERICAN MEDICAL ASSOCIATION

American Medical Association
535 North Dearborn Street, Chicago
Directory Department

August 13, 1935.

Dr. Alexander S. Begg, Secretary, Massachusetts Medical Society,

Dear Dr. Begg:

The work of revising and compiling the new Fourteenth Edition of the American Medical Directory has been started.

After every Directory is published we receive a number of complaints from physicians who have not been listed as Members or Fellows of the American Medical Association. Some of these men have possibly lost appointments with industrial firms, insurance companies, railroads, etc., because they were not indicated as members. They may have been members and let their membership lapse or new men in the community who failed to join their local society in time to indicate this information in the Directory.

To eliminate such criticism, we are asking Secretaries of State Medical Societies and Editors of State Medical Journals to coöperate in notifying all delinquents and eligible applicants that a new Directory is going to be published. It would aid greatly if a notice were placed in your publication calling to the attention of your readers the importance of sending in their data promptly when requested and the keeping up of their membership in your Society.

It will probably be two years, or 1938, before another Directory will be issued.

Thanking you for your assistance in this matter, we are

Very truly yours,
F. V. Cargill, *Manager.*

OFFICIAL ACTIONS OF THE BOARD OF REGISTRATION IN MEDICINE

State House, Boston

August 16, 1935.

Editor, *New England Journal of Medicine,*

This is to inform you that at a meeting of the Board of Registration in Medicine held August 15, 1935, it was voted to suspend until the first of September, 1935, the registration of Dr. Ainsworth Isherwood of Dracut, Massachusetts, for neglect in the care of a patient.

Yours very truly,
Stephen Rushmore, M.D., *Secretary.*

THE TREATMENT OF EPISTAXIS

August 23, 1935.

Editor, *New England Journal of Medicine,*

For several years I have found quite efficacious in cases of epistaxis a simple expedient which so far as I know has not been published in medical books or in first aid manuals.

Based upon the fact that the site of most nasal hemorrhages is the forepart of the septum, it consists merely in firmly squeezing or having squeezed with the thumb and index finger of either hand the sides of the lower or flexible part of the nose as closely as possible to the upper or hard part and to the adjacent regions of the cheeks and, after several minutes, gradually releasing the pressure unless the bleeding should recur.

Yours truly,
G. W. Haigh.

242 Burncoat Street,
Worcester, Mass.

RECENT DEATHS

JACKSON—Charles William Jackson, M.D., a retired physician of Springfield, Massachusetts, died at his home, August 21, 1935. He was born at North Brookfield in 1852, the son of Charles and Phoebe (Harwood) Jackson, and was a descendant of Major Peter Harwood who served in the War of the Revolution.

Dr. Jackson graduated from the University of Vermont Medical School in 1884. He joined the

Massachusetts Medical Society in 1892, at that time living in Monson, and retired in 1934. He was also a Fellow of the American Medical Association. For many years he was Associate Medical Examiner of Eastern Hampden District. He was a Mason, and a trustee of the Monson Savings Bank for many years.

DONAHOE—ROBERT ABBOTT DONAHOE, M.D., of 132 Mount Vernon Street, with an office at 173 Central Street, Lowell, Massachusetts, died at the St. John's Hospital in that city, August 20, 1935. Dr. Donahoe was born in 1892.

He graduated from the University of Vermont College of Medicine, 1921. He served an internship in the St. John's Hospital, afterward engaging in general practice in Lowell.

He joined the Massachusetts Medical Society in 1924 and was also a Fellow of the American Medical Association. Dr. Donahoe was appointed city physician early last year, but had been unable to practice for several months because of ill health.

He is survived by his mother and a brother, Dr. Fred Donahoe, a practicing dentist.

HAMILTON—WILLIAM DRAKE HAMILTON, M.D., a summer resident of Orleans, Massachusetts, died in that town, August 23, 1935. Dr. Hamilton was born in 1859, the son of the late Dr. and Mrs. John T. Hamilton. His death followed a long illness.

He had been prominent as a surgeon in Columbus, Ohio, for many years following his graduation from the Columbus Medical College. He was surgeon on the staff of Mt. Carmel Hospital until his retirement thirteen years ago.

He is survived by his widow, Mrs. Ann Elizabeth Hamilton, and a daughter, Mrs. Ann Sayre, of Wellfleet, Massachusetts, and New York.

OBITUARY

DR. ARTHUR HALLAM RING

Dr. Arthur Hallam Ring died at his home in Arlington, Massachusetts, on June 25, 1935. His going was sudden and unexpected. He had known, and his family had known for some time, of the heart condition which caused his death, but those who were closest to him believed that he had many more years of happy and useful living ahead of him. He died "on the job", in the midst of a busy life, at the very height of his usefulness.

Dr. Ring was born at St. John, New Brunswick, on November 17, 1874. His forebears, however, were of old Puritan stock, the first Ring to come to the Massachusetts Bay Colony in 1638 being Robert Ring who settled in Newburyport. In that vicinity the family resided for five generations, going to New Brunswick at the time of the Revolution, where the family made its home until 1881. At that time Dr. Ring's father, Dr. Allan Mott Ring, came back to the United States, and founded the Ring Sanatorium on Arlington Heights. Arthur Hallam Ring received his early education in the Arlington Schools, and his secondary education at Worcester Academy. He was given his medical degree by Boston University Medical School in 1897, and he followed his work there by a year of postgraduate study at the Harvard Medical School. In 1907-08 he studied in the psychological laboratory at Harvard University under Professor Münsterburg, and in 1909-10 he followed this with work in neuropathology under Dr. Elmer Southard at the same university.

Dr. Ring married Dr. Barbara Taylor, and they together, following a year of work at the Ring Sanatorium, engaged in private practice at West Dennis on Cape Cod. After two years there, they returned to Arlington where their son, Hallam Taylor Ring, was born.

The subsequent years were busy ones, spent in building up the Arlington Health Resort for the care of mild, mental patients. This was run on the cottage plan, beginning with one house where a few patients could be cared for, and growing gradually until it embraced several houses, with a capacity of thirty patients. The elder Dr. Ring, meanwhile, had continued to operate the Ring Sanatorium for the care of convalescent and chronic cases, and in 1912, when Dr. Allan Mott Ring became seriously ill, the two institutions were fused and became the Ring Sanatorium and Hospital, Inc.,' with a fifty-bed capacity. From that time until the time of his death, Dr. Arthur Ring was president of this corporation and superintendent of the institution, and in its present status of a sixty-bed neuropsychiatric hospital it stands as a monument and memorial to his untiring devotion, his high ethical standards, his progressive methods, and his conservative good judgment.

Dr. Ring's interests outside the institution were many and varied. For some years he was assistant editor of the *New England Medical Gazette*. He did considerable teaching, largely at Boston University Medical School, where he conducted classes in neurology from 1911 until the time of his death. In 1926 he was made assistant professor of neurology at this university. For many years, also, he served in the neurological clinic of the Massachusetts Memorial Hospitals.

His interest in the field of physical therapy was widely known. A thorough study of forms of treatment brought recognition as an authority on hydrotherapy, electrotherapy, and massage. He was instrumental in the reorganization of the New England Physical Therapy Society in 1930, and had served as its secretary until his decease. Since 1931 he had also been secretary-treasurer of the Academy of Physical Medicine. He was a member of the International Society of Medical Hydrology, and a lecturer in Hydrotherapy at the Sargent School of Physical Education.

Dr. Ring was a pioneer in the use of occupational therapy in rehabilitation work, having instituted in his sanatorium one of the earliest departments in this form of therapy. He was a member of the Massachusetts Society of Occupational Therapy, a

lecturer at the School of Handicrafts and Chairman of the Board of Directors of the Tide-over-League.

During the World War Dr. Ring served as chief of the neuropsychiatric unit at Fort Sheridan, Illinois. He remained in service there until June, 1919, at which time he was retired with the rank of major. He retained his interest in army affairs, and continued to serve in the Medical Reserve Corps. He was an active member of the Arlington Post, American Legion, and belonged also to the Military Order of the World War, the Reserve Officers Association, and the Army and Navy Club of Boston. He had long been a member of the Ancient and Honorable Artillery Company of Boston, having been five years on the staff, and was on the roster of the Heroes of '76 and the National Society of Sojourners.

Dr. Ring's versatility of interests and his wide range of usefulness are well-evidenced by the large number of medical, fraternal, and social organizations to which he gave not only financial support but time and active participation. He was a life member of Hiram Lodge, A. F. and A. M., Menotomy Royal Arch Chapter of Masons in Arlington; St. Omer Commandery, Knights Templars of Roxbury; Aleppo Temple, Order of the Mystic Shrine. He was a Fellow of the American Medical Association, member of the New England Society of Psychiatry, Massachusetts Medical Society, Massachusetts Psychiatric Society, American Association for the Advancement of Science, American Hospital Association, New England Hospital Association, American Association of Private Psychiatric Hospitals, Somerville Medical Society, Phi Chi, and the Arlington Doctors' Club. In his own town he served as a town meeting member, and belonged to the local Chamber of Commerce, the Rotary Club, Arlington Friends of the Drama, the Arlington Historical Society, the Visiting Nurses' Association and the Red Cross.

In spite of the many demands made upon him by these public and social connections, he found time for numerous interests and hobbies in his private life. He was passionately fond of music, not that of the erudite, particularly, but music with a lilt to it, a rhythm, a definite tune. He played the violin, not as a virtuoso, but with spirit and great pleasure. When of an evening he could pick up his violin, find someone to sit down at the piano, and a few others to gather around and sing lustily, he was happy indeed. He could play and sing from memory many of the better-known operas. He never could hear a marching song without wishing to raise his arms and conduct the players. He always had the desire to lead an orchestra. In fact, one of the happiest of his school-day memories was that concerning the forming and conducting by himself of a ten-piece orchestra at Worcester Academy.

His second great hobby was genealogy. He had traced his Ring ancestry back to the first Ring in this country, and he had worked out even more completely the family tree of his mother, who was a Hammond. He had made countless trips over various sections of this country and Canada in search of material for this purpose, and he had many times expressed a desire to continue the search into England. He was happy poring over old gravestones, old records, old letters that might help him. He was a member of the New England Historical and Genealogical Society.

Dr. Ring loved simple pleasures. He liked to putter with hammer and nail, with paint and saw. By instinct and natural aptitude he was an able carpenter and mechanic. He owned in the Monadnock region of New Hampshire a farmhouse over two hundred years old, which he had reclaimed from a tumble-down ruin to a home of charm and beauty, and a great deal of the actual work in the restoration of this place he had done himself.

No story of Dr. Ring's life would be complete without a mention of his dogs. Dogs loved him, instinctively. He always had one at his heels. He talked to it as to a human friend. The dog invariably responded with unwavering and complete devotion.

So much for Dr. Ring the physician, the soldier, the public-spirited citizen, the man. Of Dr. Ring the friend, the understanding and wise counselor, much more could be said. He had the rare faculty of having many facets to his nature, and yet always being able to submerge his own mood to meet with sympathetic understanding the mood and need of the many who came to him for help. One could tell things to him—things personal, things about one's own inner self that one could not have found courage to tell to anyone else. He never failed to help, and his help was not only spiritual and philosophical, but practical and, if need be, financial. He had given countless people new hope, new courage—a "lift" in life. Small wonder that his sudden going left a feeling of stunned helplessness in the minds of all who knew him. Small wonder that they came from far and near, and from all walks of life, to pay him tribute at the end. Very true are the words of his town paper:

> "He was a power in the community and in the world of medicine, but far beyond he was a generous and kindly man. His labors were not confined to leading the sick back to health and sanity; the troubles of his friends were as his own, and his friends as numerous as the sands of the sea."

NOTICES

SEVENTH ANNUAL TRAINING COURSE FOR MEDICAL RESERVISTS AT THE MAYO CLINIC

The two weeks' period, October 6 to 20, 1935, has been selected for the Seventh Annual Training Course for Medical Department Reservists of the United States Army and Navy, at the Mayo Clinic, Rochester, Minnesota.

These training courses at the Mayo Clinic were inaugurated by the Seventh Corps Area to give mili-

tary training to the young Medical Corps Reserve Officers on the staff of that institution, who could not attend summer camps. It developed that Reservists not connected with the Clinic desired to attend. It was noted that inasmuch as the military work was given in the afternoon and evening hours, these men were able to attend the strictly professional presentations by the staff of the Mayo Clinic during the morning hours. In recent years, special professional presentations have been arranged as a regular part of the course.

The program will follow the plan which has been so successful in past years. The morning hours will be devoted entirely to professional work in special clinics and study groups. Officers in attendance may select the course they wish to follow from the wide variety of presentations offered. The afternoons and evenings will be devoted to Medico-Military subjects.

The Staff and Faculty of the Mayo Clinic will present the professional training, while the Medico-Military Program will be under the direction of the Surgeon of the Seventh Corps Area (Army) and the Surgeon of the Ninth Naval District (Navy).

Enrollment is open to all Army and Navy Reservists of Medical Departments, in good standing. Applications should be submitted to the Surgeon, Seventh Corps Area, Omaha, Nebraska, or the Surgeon, Ninth Naval District, Great Lakes, Illinois. Enrollment is limited to two hundred.

The Surgeon Generals of the Army, the Navy and the Public Health Service have all signified their desire and intention of being present during at least a portion of the course.

INTERNATIONAL MEDICAL POSTGRADUATE COURSES IN BERLIN

The Berliner Akademie für ärztliche Fortbildung, the successor of the Dozentenvereinigung für ärztliche Fortbildung in Berlin, which is managed by the Chief Burgomaster of Berlin, is holding the following medical postgraduate courses in the Autumn of 1935:

1. Throat, nose and ear course (30 September-12 October). Fee 120 RM.
2. Course in infectious diseases (30 September-5 October). Fee 40 RM.
3. Internal medicine from the point of view of functional pathology and therapy (7-19 October). Fee 60 RM.
4. The biology of heredity and racial purity in medical practice (7-12 October). Fee 40 RM.
5. Course in tuberculosis in the City of Berlin's Tuberculosis Hospital "Waldhaus Charlottenburg" in Sommerfeld (21-26 October). Fee 50 RM.
6. The surgery of intrathoracic diseases with special regard to pulmonary tuberculosis (28 October-1 November). Fee 80 RM.
7. Special courses in all branches of medicine, with practical work at the bedside and in the laboratory, are held every month. The fee is 50-80 RM. for eight periods of two hours.

For programmes and further information apply to the Geschäftsstelle der Berliner Akademie für ärztliche Fortbildung, Robert Koch-Platz 7 (Kaiserin Friedrich-Haus), Berlin NW 7.

Foreign doctors and German doctors resident abroad are granted a reduction of fare of 60 per cent on the German Railways Company's lines; a foreign doctor can reduce the cost of his stay considerably by utilizing what are called "registered marks"; arrange matters with the local bank before starting.

SOCIETY MEETINGS, CONGRESSES AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING MONDAY, SEPTEMBER 2, 1935

Wednesday, September 4—
†12 M. Clinico-Pathological Conference. Children's Hospital.

Saturday, September 7—
*10-12 Staff rounds at the Peter Bent Brigham Hospital.

*Open to the medical profession.
†Open to Fellows of the Massachusetts Medical Society.

September 5, 6, 7—American Congress of Physical Therapy will meet at the Hotel Kansas Citian, Kansas City, Missouri. Program and circular of information may be secured by addressing: American Congress of Physical Therapy, 30 North Michigan Avenue, Chicago, Illinois.

September 17, 18, 19—Eleventh Clinical Congress of the Connecticut State Medical Society. For details address Dr. Creighton Barker, 129 Whitney Avenue, New Haven, Conn.

September 30-October 12—International Medical Post-Graduate Courses in Berlin. See notice elsewhere on this page.

October 6-20—Seventh Annual Training Course For Medical Reservists at the Mayo Clinic. See page 441.

October 7-10—American Public Health Association will meet in Milwaukee, Wisconsin. For information address the American Public Health Association, 50 West 50th Street, New York City.

October 21 - November 2—1935 Graduate Fortnight of the New York Academy of Medicine. See page 898, issue of May 9.

October 28 - November 1—The Twenty-Fifth Clinical Congress of the American College of Surgeons. See page 1065, issue of May 30.

BOOK REVIEWS

The Nervous Patient. A frontier of internal medicine. Charles P. Emerson. 453 pp. Philadelphia, London, and Montreal: J. B. Lippincott Company. $4.00.

This large book is a general review of various mechanisms of the body as they are reflected largely in nervous symptomatology. The approach is from the general field of medicine toward psychiatry, rather than from the field of psychiatry toward medicine. Because of this the book has considerable value, for it not only forms an interesting correlation between mental and nervous states and somatic disease, but, in addition, it reviews nearly all the common disease conditions of the body. Its chief weakness is its diffuseness. Had the author covered a less extensive field, the book would have been of more value. The short bibliographies following each chapter, moreover, are not a critical review of the most important literature on the subject.

Wish and Wisdom. Episodes in the vagaries of belief. Joseph Jastrow. 394 pp. New York and London: D. Appleton-Century Company, Inc. $3.50.

Professor Jastrow, who is well known as a psychologist and the writer of popular books on the subject, has made a careful review of the history of erratic beliefs, many of which have had a wide influence in the course of civilization. Here one finds the story of ancient miracle-mongers, the cult of the magnet, the ouija board, psychic adventurers and animal geniuses, queer side-shows of sciences such as numerology, palmistry, the philosopher's stone, auras and vibrations, ectoplasm and other psychic phenomena. The book is well written and of considerable interest, for it contains much material not easily found elsewhere. Its value as a serious book, however, is much impaired by the lack of references. A few illustrations are of interest. As a popular study of the queer reactions of the human mind this book is to be recommended.

Martini's Principles and Practice of Physical Diagnosis. Edited by Robert F. Loeb. From the authorized translation by George J. Farber. 213 pp. Philadelphia, Montreal and London: J. B. Lippincott Company.

This volume is a translation of a German work, and in 200 pages gives a comprehensive survey of what is essential in physical examination of the patient.

It is difficult to dissociate physical diagnosis disease pictures and physiology, but by clinging to bare essentials the authors are able to explain the causes of physical signs without incorporating chapters from general medicine. The largest part of the book is devoted to examination of the heart and lungs with the combination of signs found in common diseases tabulated in convenient form.

If anything, the book is too concise; but with physical diagnosis taught largely in hospitals as it is today, students will find a ready elucidation of the brief descriptions, in their clinical material. The translators have added a very valuable textbook to clinical teaching in English.

Clio Medica. Edited by E. B. Krumbhaar. XV. French Medicine. M. Laignel-Lavastine, and M. Raymond Molinery. 187 pp. New York: Paul B. Hoeber, Inc. $2.50.

This is a well written, short, concise book on the history of French Medicine. It is one of a series of historical narratives aimed to give the reader the high spots of medical history, with the hope that his interest in this field will be stimulated to further reading.

The chapters dealing with French Medicine during the Renaissance and the 17th and 18th centuries are very instructive and interesting. Short accounts of Ambroise Paré, Paracelsus, Rabelais and Fagon are given. The history of the Faculty of Medicine of Paris, and the traditional rivalry between the surgeons of the above faculty and those associated with the College of Saint-Come, is very fascinating.

The book is inexpensive, and can be read in a few hours.

Onchocerciasis. With special reference to the Central American form of the disease. Contributions from the Department of Tropical Medicine and The Institute for Tropical Biology and Medicine. No. VI. Part I by Richard P. Strong. Part II by Jack H. Sandground. Part III by Joseph C. Bequaert. Part IV by Migual Munoz Ochoa. 234 pp. Cambridge: Harvard University Press.

Pursuant to expeditions to Guatemala in 1931 and 1932 to study "*Onchocerca coecutiens*, the blinding filaria", Dr. Richard P. Strong and his Associates have published an important monograph on Onchocerciasis.

Part I of the monograph was written by Strong himself. Among other topics, it deals with the distribution of onchocerciasis, its epidemiology, and its clinical and pathological characteristics. Other sections of Part I describe the mode of transmission and discuss prophylaxis and treatment as well as other important aspects of onchocerciasis.

In Part II, Jack H. Sandground discusses questions of taxonomy relating to the Genus *Onchocerca*.

Joseph C. Bequaert, in Part III, deals with the various species of black flies or *Simuliidae* of Guatemala and devotes special attention to those found in the region in which onchocerciasis is endemic.

In Part IV, Dr. Ochoa, of the Health Department of Guatemala, contributes additional facts of epidemiological significance.

The monograph, as a whole, is the most comprehensive work that has yet appeared on onchocerciasis. It contains much new information, points the way to control of the disease, and, possibly, to its eradication. The authors found that, not one only, but at least three species of *Simulium* can transmit onchocerciasis. The various phases of the work are well illustrated with photographs, photomicrographs or colored plates.

Epidemics and Crowd-Diseases. Major Greenwood. 409 pp. New York: The Macmillan Company, $5.50.

The author states that "this book is based on the instruction which I give to professional students at the London School of Hygiene and Tropical Medicine . . . but it is not a text book prepared with an eye to an examination syllabus. I have tried to cater . . . to all educated men and women interested in the communal aspects of health and disease——."

Such readers will find the book most interesting particularly in its historical aspects. Its style is philosophical. The author does not hesitate to qualify a previous deduction whenever the subsequent consideration of some other phase of the subject seems to make it desirable to do so. His style, however, often makes it difficult to tell

whether he is stating his own conclusions or presenting the ideas or methods of epidemiologists who assume that the factors, variable or otherwise, in the etiology of diseases which handicapped Hippocrates and Galen, have been eliminated by modern research to such an extent that, if a large group of human beings be exposed to infective agents with varying pathogenic possibilities and simultaneously subjected to mysterious biological variables, the consequences may be expressed by means of a mathematical formula.

Whether with the author's endorsement or not, he shows us examples of the exercise of selectivity with respect to observations which serve to provide premises for logical conclusions; of a faith in records of morbidity and causes of death practically amounting to gullibility; and of the employment of mathematical devices in ways which remind one of the confused student who tries to solve an algebraic equation by differentiating it, and which leads the reader to expect to see that somebody has demonstrated how something can be intergraded to explain why epidemic manifestations of anterior poliomyelitis abruptly cease at the very season of the year when epidemics of personal contact diseases regularly begin.

A difference in the point of view will likewise lead a reader of this book, who has felt personal responsibility, military or civil, for the maintenance of the health of large collections of human beings, to note the author's failure to observe that epidemic curves may be changed in shape by an intelligent practical recognition of the fact that contagious diseases are contagious before a positive diagnosis is possible; that the absence of positively diagnostic symptoms in the course of influenza and the freedom with which English physicians are accustomed to employ this term, make deductions from records of the relative prevalence of influenza in different English schools at different times extremely precarious; and also in connection with the same disease, that its mortality curve will be determined by the opportunity which those who may be stricken by a relatively harmless primary infection are given to acquire also hemolytic streptococci and other pathogenic potentialities with murderous proclivities as secondary invaders.

Ideal Health or The Laws of Life and Health. Alexander Bryce. Third Edition. 340 pp. Baltimore: William Wood & Company. $2.75.

This book is one which should make a strong appeal to the younger practitioners, whose medical scholastic training of four years supplemented by two years at least of interneship, has lacked a coherent, individualized course in the all-important, everyday, rational work of taking good care of their bodies and preserving their health. These matters which vitally concern everybody are supposed to come to us by heredity, family training, earliest maternal instruction, nurses' upbringing, racial customs, traditions and conventionalities, but most of all from home influences. Unfortunately these vital matters are left too much to chance, or one might say they are "everybody's business", and therefore they are nobody's special business.

Dr. Bryce, the author of this practical and useful little book, makes it his special business to sum up traditions, customs, racial habits, hygienic advice and theories, universal experiences, fads and scientific dicta, in twelve chapters. Each chapter has a sort of "golden text," or so-called "law" of health as a beginning. The first two chapters have the same law as a text, namely, Law I. "Eat three meals each day of plain, wholesome, solid, nourishing food at or about the same time as far as possible." Chapter I is devoted to "Food in General" and Chapter II to a detailed consideration of food.

The concluding chapter instead of illustrating any special law has for a motto "Do Unto Others as Ye Would that They Should Do Unto You," which is applicable enough for its subject, "Eugenics; the Science of Race Culture." Each of the twelve chapters concludes with an admirable, succinct and adequate summary.

Dr. Bryce does not seem to be strongly partisan in his views or devoted to any special theories, but discusses his various subjects (and they are numerous) from a very conservative, common-sense standpoint, in a scholarly way without exuberance or overenthusiasm. Although a "total abstainer" he is not fanatical. He does not recommend the free and constant drinking of tea, coffee and alcohol, or the use of tobacco. One might say everything having to do with food, digestion, drink, sleep, rest, exercise, bathing, work, recreation, effect of the mind on the body, regularity, habit formation, air, cleanliness, clothing—in short everything that influences the body for good or evil, is very briefly considered by Dr. Bryce, and an opinion in favor of or in opposition to, is definitely expressed.

No new theories, facts or opinions are given but the sum of knowledge concerning the laws of health and how to keep well are presented, in clear, unmistakable language, in an attractive and convincing manner. The book is sure to make friends for itself.

The American Illustrated Medical Dictionary. A complete dictionary of the terms used in medicine, surgery, dentistry, pharmacy, chemistry, nursing, veterinary science, biology, medical biography, etc., with the pronunciation, derivation and definition. W. A. Newman Dorland. Seventeenth Edition. 1573 pp. Philadelphia and London: W. B. Saunders Company. $7.00.

An octavo volume of 1573 pages with 945 illustrations including 283 portraits, this edition represents three years' work under editorial supervision of the Staff of the American Medical Association.

The text is clear, the paper and binding of excellent quality.

Methods and Materials of Health Education. Jesse Feiring Williams and Fannie B. Shaw. 331 pp. New York: Thomas Nelson & Sons.

This book is written mainly for educators. In it the authors have shown how, in a modern community, the school system may function decisively in promoting and safeguarding the health of the school population. For the authors "health education" signifies far more than mere instruction in personal hygiene. It means the integration of all the forces that the school may exert for the healthful mental and physical development of the school child.

In the first part, under the heading "Nature of the Child", are discussed the various phases of normal mental and physical growth and development; the factors which influence them; and the chief causes of morbidity and mortality affecting children. Under the caption "Healthful School Living" are discussed the various health-promoting elements in the school environment. Under "Health Service" are discussed the subjects of physical examination, the correction of physical defects and the protection of the school population from communicable diseases, including tests for susceptibility, prophylactic vaccinations and inoculations.

The section on "Health Instruction" deals with methods of imparting correct and useful instruction on personal hygiene and healthful living to school children.

The final section deals with a subject too often neglected, the personal health of the teacher. Statements in the book are supported by many references. This is a useful textbook for teachers.

Diet and Physical Efficiency. The influence of frequency of meals upon physical efficiency and industrial productivity. Howard W. Haggard and Leon A. Greenberg. 180 pp. New Haven: Yale University Press. $3.00.

In an attempt to discover and formulate the best times of eating, the investigators have observed and described in this book, the effects of variations in the consumption of meals on the blood sugar, respiratory quotient, and physical efficiency of human beings. Most of the observations were made on factory workers, and some of them were found to increase their productivity, if five instead of three meals of much the same kind and amount of food were consumed. And the observations made on the blood sugar and respiratory quotient of children, students, and men and women doing light and heavy work, were also found advantageous, if more than three meals were ingested. The results of this study appear beneficial from the standpoint of productivity for a short period; on the other hand as Americans are generally considered to overeat at three meals, such a regimen is likely to prove inimical to health if carried out for a long period. The book contains many figures and tables, a few illustrations, and a complete bibliography; and as it is devoted to a special field of nutrition should be of interest to manufacturers and specialists in nutrition.

The International Medical Annual. A year book of treatment and practitioner's index. 1935. Fifty-Third year. Edited by H. Letheby Tidy and A. Rendle Short. 522 pp. Baltimore: William Wood & Company. $6.00.

This volume, edited by H. Letheby Tidy and A. Rendle Short, marks the thirty-third year of its publication. In the introduction the editors briefly review the major achievements of medicine in the past year. The main part of the book consists in an encyclopedically arranged review of the most important articles in the entire field of medical literature. The long list of contributors is selected from the leading men in their respective specialties in Great Britain.

The skill that has been shown in condensing such a great amount of material into one volume is truly remarkable. The generous use of illustrations, the bibliography accompanying each article, and the detailed general index add greatly to its practical value. It is a quick reference book that should prove useful to every practitioner of medicine.

Studies from the Rockefeller Institute for Medical Research. Reprints. Volume 92. 588 pp. New York: The Rockefeller Institute for Medical Research. 1935.

There are two groups of articles of special interest in this volume containing a wide variety of material from the laboratories and hospital of the Rockefeller Institute. The first group concerns the work of Page on pressor and depressor substances obtained from the human blood. The work is done with unusual care and accuracy and should do much to clarify the rather confusing statements at present current in the literature.

The second group consists of the studies on the virus-induced tumor of rabbits reported by Peyton Rous and his collaborators. This Shope rabbit papilloma is one of the most interesting of the animal tumors owing to its known etiology and the marked similarity of the growth to certain neoplasms. At times this reaction to virus has some of the characteristics of a malignant neoplasm.

From the standpoint of those interested in legal medicine, Landsteiner's able review, "Forensic Application of Serologic Individuality Tests", will be of definite interest.

Diseases of Children. Edited by Hugh Thursfield and Donald Paterson. Third Edition. 1152 pp. Baltimore: William Wood & Company. $10.00.

Thursfield and Paterson's third edition of Diseases of Children is not just another book on a subject already very satisfactorily covered in English. It is one of the most comprehensive of pediatric texts

and is written by thirty-six contributors who have in this edition again successfully added the important advances in this field. The reviewer feels that this textbook can be especially recommended to American students and physicians interested in this subject. The reader is always impressed by Cameron's contributions. This author's presentation of "Functional Diseases of the Nervous System" is illustrative of many almost classical textbook expositions of clinical subjects found in this volume.

Recording of Local Health Work. W. F. Walker and Carolina R. Randolph. 275 pp. New York: The Commonwealth Fund, London: Humphrey Milford. Oxford University Press. $2.00.

Obviously the records kept by local health organizations are the only means for evaluating the effectiveness of the work, determining the trends of communicable and other diseases and of demonstrating to taxpayers and appropriating bodies the dividends on their investment in health protection.

Yet the inadequacy of the records kept are too often the weakness of an otherwise aggressive and effective local health organization. By the presentation of the system of record-keeping set forth in their book, Dr. Walker and Miss Randolph have made a useful contribution to the Science of Public Health Administration. The book constitutes a complete manual of record-keeping in local health work. A series of standard forms for records approved by the Committee on Administrative Practice of the American Public Health Association are presented with the necessary explanatory comments. This is a book which merits a place on the bookshelves of local health offices. The practical application of its principles of record-keeping would give the local health officer a firm grasp on the local health situation and point the way to obvious means for strengthening and improving local health organizations. Reports based on such records would give the State Health Officer an accurate picture of the activities of local health organizations and greatly facilitate the work of supervision, standardization and coördination.

The Surgical Clinics of North America. June, 1935. Volume 15, Number 3. Chicago Number. 782 pp. Philadelphia and London: W. B. Saunders Company. Paper, $12.00; Cloth, $16.00 net.

The feature of this issue of the Surgical Clinics is a symposium on fractures. Speed reports two cases of unusual nerve involvement, one with a fracture of the head of the fibula and the other following an elbow fracture with overgrowth of the head of the radius. Strauss presents a rather detailed discussion of fracture of the femur in children, emphasizing the value of Russell traction. Some new points in the treatment of fractures of the sternum are brought out by Ellis.

His careful methods of examining the back are outlined by Magnuson while Kreuscher discusses the surgical aspects of backache.

Among the other more interesting clinics are one by Bettman on injuries of the chest and Bevan's able presentation of the problem of the treatment of peritonitis.

The other clinics include several that help make this issue one of practical value to all surgeons.

The Story of Medicine in the Middle Ages. David Riesman. 402 pp. New York: Paul B. Hoeber, Inc. $5.00.

The revival of scholasticism in philosophical circles in these days is accompanied by renewed interest in other phases of medieval thought and life as shown by the biographies, historical novels and even the rewriting of history itself. Since scholasticism is the forerunner of modern scientific thought it is natural that a review of medicine in the Middle Ages should be made.

This book—intended largely as a text for medical students—tells the story of medieval medicine in an interesting although familiar manner. Even though the presentation is not so sympathetic with those not-so-distant years, as one might wish, the facts presented closely agree with the writings of other serious students of those times (Sudhoff, Walsh, Sigerist, etc.), and the differences lie in emphasis and interpretation. Most of the information can be obtained, in a scattered way, elsewhere, but the material is so pleasantly assembled and, in addition to the factual medical history, the pages are filled with so many interesting digressions, anecdotes and short dissertations on universities, guilds, monasticism and other aspects of medieval life that had important bearings on medicine, that the student accustomed to thinking only of the feudalism and tenure of the Dark Ages, will find the book refreshing. It is thoroughly indexed and adequately illustrated and ought to serve its purpose rather well.

L'Examen du Malade. Guide clinique de l'étudiant et du médecin. Médecine, Chirurgie, Obstétrique, Neurologie et Spécialites. P. Delmas, G. Giraud, et al. 318 pp. Paris: Masson et Cie. 30 fr.

This small volume of three hundred and eighteen pages on the examination of the patient is extremely well done. While not a treatise on diagnosis or physical diagnosis, the book should serve as a useful guide to students and general practitioners. It is indeed interesting to note the stress placed on "Observation" or, what we call inspection, and the signs that can be observed in various diseases from inspection alone.

The specialties such as ear, nose, throat, gynecology, neurology, pediatrics and others are adequately discussed in reference to signs and symptoms, and presented in a very practical manner.

The last chapter is devoted to laboratory procedures, and the authors mention the precautions one should take in the interpretation of them.